



D-Series M12 800MHz C2PC

Report on Test Measurements for FCC ID
ABZ89FT5902, IC 109AB-T5902, HVIN T8899-800H
per FCC 47 CFR 90 and IC RSS-119

Matt Nawrocki

8/19/2026

Report on Test Measurements

Tested Unit Details

Model Under Test	D-Series M12 800MHz UHFR1
T-Model Number	T8899A
Serial Number	800VHPEMC
Firmware Version	Dseries_bundle-9.10.31
DSC8500 Site Processors (PMLN7832A)	CAI26SFWTT, CAI25PW7GS
Band of Operation	Transmit 851-870MHz
Modulation Type	C4FM, LSM, H-DQPSK
Antenna Type	N/A*
Antenna Gain (dBi)	N/A
Manufacturer	Motorola Solutions 2540 Galvin Drive, Elgin, IL 60124

*The product is not sold with an antenna. The customer provides their own antenna for installation. RF testing was performed with RF Cables connecting the base radio to attenuators/test equipment for measurement. Emissions testing had the amplifier connected to an RF load through RF cables. A sample antenna is used for EME calculations as part of the application for certification.

Measurement Uncertainty

Measurement	Frequency	Expanded Uncertainty
RF Power Output	50MHz-10GHz	+/-0.132dB
Carrier Frequency Stability	9kHz-13GHz	+/-0.368Hz
Occupied Bandwidth	9kHz-13GHz	+/-0.52dB
Transmitter Conducted Spurious Emissions	9kHz-13GHz	+/-0.64dB
Transient Frequency Behavior	9kHz-13GHz	+/-2.04dB
Modulation Characteristics	100Hz-5000Hz	+/-0.40dB
Radiated Emissions	30MHz-1000MHz	4.3dB**
Radiated Emissions	1GHz-6GHz	3.1dB**

** Information from Elite Electronic Engineering radiated emissions test report.

Report on Test Measurements

Test Results Summary

Test	47 CFR Reference	RSS-119 Reference	Results
RF Output Power	2.1046	4.1,5.4	Pass
Occupied Bandwidth	2.1049	5.5	Pass
Conducted Spurious Emissions	2.1051	4.2,5.8	Pass
Radiated Spurious Emissions	2.1053 90.210	4.2,5.8	Pass
Frequency Stability	2.1055	5.3	Pass
Frequency Transient Behavior	90.214	5.9	Pass
Modulation Characteristics	2.1047		N/A*

* No analog modulation capability

Test Standards:

Title 47 Part 2 of Code of Federal Regulations

Title 47 Part 90 of Code of Federal Regulations

RSS-119 Land Mobile and Fixed Equipment Operating in the Frequency Range 27.41-960 MHz Issue 12

ANSI C63.26-2015 American National Standard for Compliance Testing of Transmitters

Used in Licensed Radio Services

ANSI C63.4-2014 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range 9 kHz to 40 Ghz

Report on Test Measurements

Motorola Solutions Schaumburg Lab RF Testing Process

RF testing by the Motorola Solutions Schaumburg Lab are performed per the standards referenced in the test results summary. The lab performs these measurements in the test location documented below. The test lab has been accredited by A2LA for each of these measurements.

The test lab performs the measurements using commercial off-the-shelf (COTS) test equipment setup in automated test systems. These measurements are automated using LabVIEW software developed in the lab. Path losses are characterized using a network analyzer. The measured losses are stored in files for each RF path to be retrieved during the testing to provide the final measurements.

TX Conducted emissions measurements are measured using a notch filter to remove the fundamental signal to improve measurement dynamic range. TX Conducted Harmonics measurements use high pass filters to remove the fundamental signal to improve measurement dynamic range. Simplified measurement system diagrams and pictures are included at the end of this report.

Radiated Emissions Measurements

Radiated Emissions measurements were not performed for this permissive change filing after discussions with Elite Electronic Engineering in Downers Grove, IL.

Test Lab Information:

Lab Name	Address	Accreditation Body	Certificate Number	Expiration Date
Motorola Solutions, Inc., Schaumburg Lab	2000 Progress Parkway Schaumburg, IL 60196	A2LA	2518.09	June 30, 2027

Report on Test Measurements

System Cabling

General Product Description: The D-Series M12 product is a full RF Site product. The rack contains up to 12 transceivers, 6 power amplifiers, 2 DSC8500 site processors and a radio frequency distribution system (RFDS). Additionally the RF site contains optional switches and a AC power shelf. The system can support up to 12 RF channels and up to 90W RF power per channel depending on the configuration.

The system as configured for this testing was setup to support maximum power and power combining components to have a single transmitter output connection from a TX filter as supplied in the site. This measurement point is considered the rack output point for RF measurements.

For this testing 48VDC was provided to the Junction Panel to power the RF Site. The optional 2nd TX bank was not installed. 6 PAs and 12 XCVRs were installed in the rack.

Junction Panel (Open Rack Only) (Cabinet has junction panel included in the top lid)	2RU
Breaker Access	3RU
Bank 1 TX Post Filter/PMU RX Presselector (Optional) Bank 2 TX Post Filter/PMU (Optional) Diversity Presselector Branch B	5RU
Airflow	
RMC Cage (1-2 site RMC, 1-4 Cabinet RMC)	3RU
N-way Combiner (1 per TX Antenna)	2RU
PA Cardcage Power Amplifiers PA Fan Kits (3), Filter, and Air Intake N-way Splitter (1 Per TX Antenna)	13RU
Transceiver Cardcage (qty 1-12) with dual 6 way exciter combiner	5RU
Cable bracket	1RU
DSC 8500	1RU
DSC 8500	1RU
Cable bracket	1RU
(Optional) Redundant Gateway (Juniper SRX 345)	1RU
Gateway (Juniper SRX 345)	1RU
(Optional) AC Supply	4RU

Report on Test Measurements

Measurements Report

The measurement report shows compliance information against the pertinent technical standards. Each parameter is measured generally at the low end, middle, and at the high end of the applicable frequency band. Each section of the report contains either verbiage or graphs which show compliance to applicable standards as required, explains testing method used, and indicates what the applicable specification is.

A list of test equipment for all sections, and certification signoff page are included at the end of the measurement report.

SUBMITTED MEASURED DATA -- INDEX

EXHIBIT DESCRIPTION

E1-1	RF Output-Data
E1-2	Occupied Bandwidth, Digital Emissions: Setup, Specifications, and Index
E1-2.1, 2, 3	Linear Simulcast Modulation (LSM)
E1-2.4, 5, 6	Compatible 4-Level Frequency Modulation (C4FM)
E1-2.7, 8, 9	H-DQPSK, P25 Two Slot TDMA Digital Modulation
E1-3	Conducted Spurious Emissions: Setup, Specifications, and Index
E1-3.1	LSM Conducted Spurious Harmonic Emissions, Power 90 Watts (Average)
E1-3.2	LSM Conducted Spurious Harmonic Emissions, Power 2 Watts (Average)
E1-3.3	C4FM Conducted Spurious Harmonic Emissions, Power 90 Watts
E1-3.4	C4FM Conducted Spurious Harmonic Emissions, Power 2 Watts
E1-3.5	H-DQPSK Conducted Spurious Harmonic Emissions, Power 90 Watts
E1-3.6	H-DQPSK Conducted Spurious Harmonic Emissions, Power 2 Watts
E1-3.7, 8, 9	Conducted Spurious Emission Spectrum, 200 MHz Span, Power Output at 90 Watts, LSM
E1-3.10, 11, 12	Conducted Spurious Emission Spectrum, 200 MHz Span, Power Output at 90 Watts, C4FM
E1-3.13, 14, 15	Conducted Spurious Emission Spectrum, 200 MHz Span, Power Output at 90 Watts, H-DQPSK
E1-4	Radiated Spurious Emissions: Setup, Specifications, and Index
E1-4.1	C4FM Radiated Spurious Harmonic Emissions, Power 90 Watts 851MHz
E1-4.2	C4FM Radiated Spurious Harmonic Emissions, Power 2 Watts 851MHz
E1-4.3	LSM Radiated Spurious Harmonic Emissions, Power 90 Watts 852MHz
E1-4.4	LSM Radiated Spurious Harmonic Emissions, Power 2 Watts 852MHz
E1-4.5	C4FM Radiated Spurious Harmonic Emissions, Power 90 Watts 859MHz
E1-4.6	C4FM Radiated Spurious Harmonic Emissions, Power 2 Watts 859MHz
E1-4.7	H-DQPSK Radiated Spurious Harmonic Emissions, Power 90 Watts 860MHz
E1-4.8	H-DQPSK Radiated Spurious Harmonic Emissions, Power 2 Watts 860MHz
E1-4.9	C4FM Radiated Spurious Harmonic Emissions, Power 90 Watts 869MHz

APPLICANT: MOTOROLA SOLUTIONS

**EQUIPMENT TYPE: ABZ89FT5902
109AB-T5902**

Report on Test Measurements

- E1-4.10 C4FM Radiated Spurious Harmonic Emissions, Power 2 Watts 869MHz
- E1-4.11 H-DQPSK Radiated Spurious Harmonic Emissions, Power 90 Watts
870MHz
- E1-4.12 H-DQPSK Radiated Spurious Harmonic Emissions, Power 2 Watts
870MHz

- E1-5 Frequency Stability: Setup, Specifications, and Index
 - E1-5.1 Frequency Stability Vs Temperature
 - E1-5.2 Frequency Stability Vs Voltage

- E1-6 Test Setup Details
- E1-7 Statement of Certification

Report on Test Measurements*RF Power Output Data*

The RF power output was measured with the indicated voltage applied to the RF Site. The Power indicated is the measured power at the output of the TX Filter. C4FM/LSM/H-DQPSK Max Power requested is 90W. Low Power requested is 2W. The signals are modulated as noted.

Power measurements are obtained using a Rohde & Schwarz Power Sensor (NRP-Z11). The output of the base radio is connected to a directional coupler and attenuator through an RF cable and routed to the power sensor. The reported output power takes into account the path losses through the RF cables, attenuator, coupler to the power sensor. This number is measured prior to testing using a network analyzer. Average power is reported.

The current measured includes the power necessary to power the entire, fully-loaded rack with 1 channel transmitting.

C4FM Modulation

Temperature	25°C			
Voltage (V)	48V			
Frequency (MHz)	Low Power (W)	Current (A)	Max Power (W)	Current (A)
851	1.98	36.78	89.83	46.83
860	2.0	36.73	94.92	45.44
870	2.1	36.76	96.25	46.03

LSM Modulation

Temperature	25°C			
Voltage (V)	48V			
Frequency (MHz)	Low Power (W)	Current (A)	Max Power (W)	Current (A)
851	2.01	36.79	92.08	46.74
860	2.1	36.72	96.02	45.32
870	2.22	36.78	95.01	46.47

H-DQPSK Modulation

Temperature	25°C			
Voltage (V)	48V			
Frequency (MHz)	Low Power (W)	Current (A)	Max Power (W)	Current (A)
851	1.99	36.83	90.83	46.30
860	2.19	36.73	93.55	45.53
870	2.1	36.76	95.86	46.26

Report on Test Measurements

Occupied Bandwidth – Linear Simulcast Modulation (LSM), 12.5 kHz Channel Spacing

Linear Simulcast Modulation can be used in a system configuration based upon channel usage as described in Exhibit B. The 'D1E' emission designator provides usage for telephony, the 'D1D' provides usage for data / telecommand, and the 'D1W' provides for usage as a combination. All are spectrally identical. The occupied bandwidth charts reference the following setup and specification requirements.

Modulation Type: Linear Simulcast Modulation, LSM
Emission Designator: 8K70D1E, 8K70D1D, 8K70D1W
Channelization: 12.5 kHz
Power Setting: 90 Watts, Average

Specification Requirement 47 CFR §90.210(d) and IC RSS-119 section 5.8.3 - Emission Limits – “D-Mask”:

Emission Mask D. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth (f_0) to 5.625 kHz removed from f_0 : *Zero dB*
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: *At least $7.27 * (f_d - 2.88 \text{ kHz}) \text{ dB}$*
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: *At least 50 plus $10 \log_{10}(P) \text{ dB}$ or 70 dB, whichever is the lesser attenuation.*

(4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide to capture the true peak emission of the equipment under test. In order to show compliance with the emissions mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to ensure that the emission profile is developed.

Necessary Bandwidth Calculation: The necessary bandwidth of the modulation signal is not directly calculable per the composite modulation formulas defined in 47 CFR §2.202(g) / TRC-43 section 8. Quadrature Phase Shift Keying is used to modulate a carrier with a digital bit stream: Data Rate: $R = 9600 \text{ bps}$; Bits per Symbol: $S=4$; $B_n = 2BK$; $B = R/\log_2(s) = 9600/\log_2(4) = 4800$; $K=0.9$; $B_n = 2*4800*0.9$; $B_n = 8700 \text{ Hz}$. The necessary bandwidth of 8.70 kHz is based upon a 99% power measurement of the transmitter spectrum, per §2.202(a) / TRC-43 section 7(c).

Measurement Procedure and Instrument Settings:Emission Measurement Analyzer Settings

Horizontal:	12.5 kHz per Division	Resolution BW:	100 Hz
Vertical:	10 dB per Division	Video BW:	10 kHz
Sweep Time:	72 Seconds (<2 kHz/Sec)	Span:	125 kHz
Detector:	Peak		

Measured Occupied Bandwidth

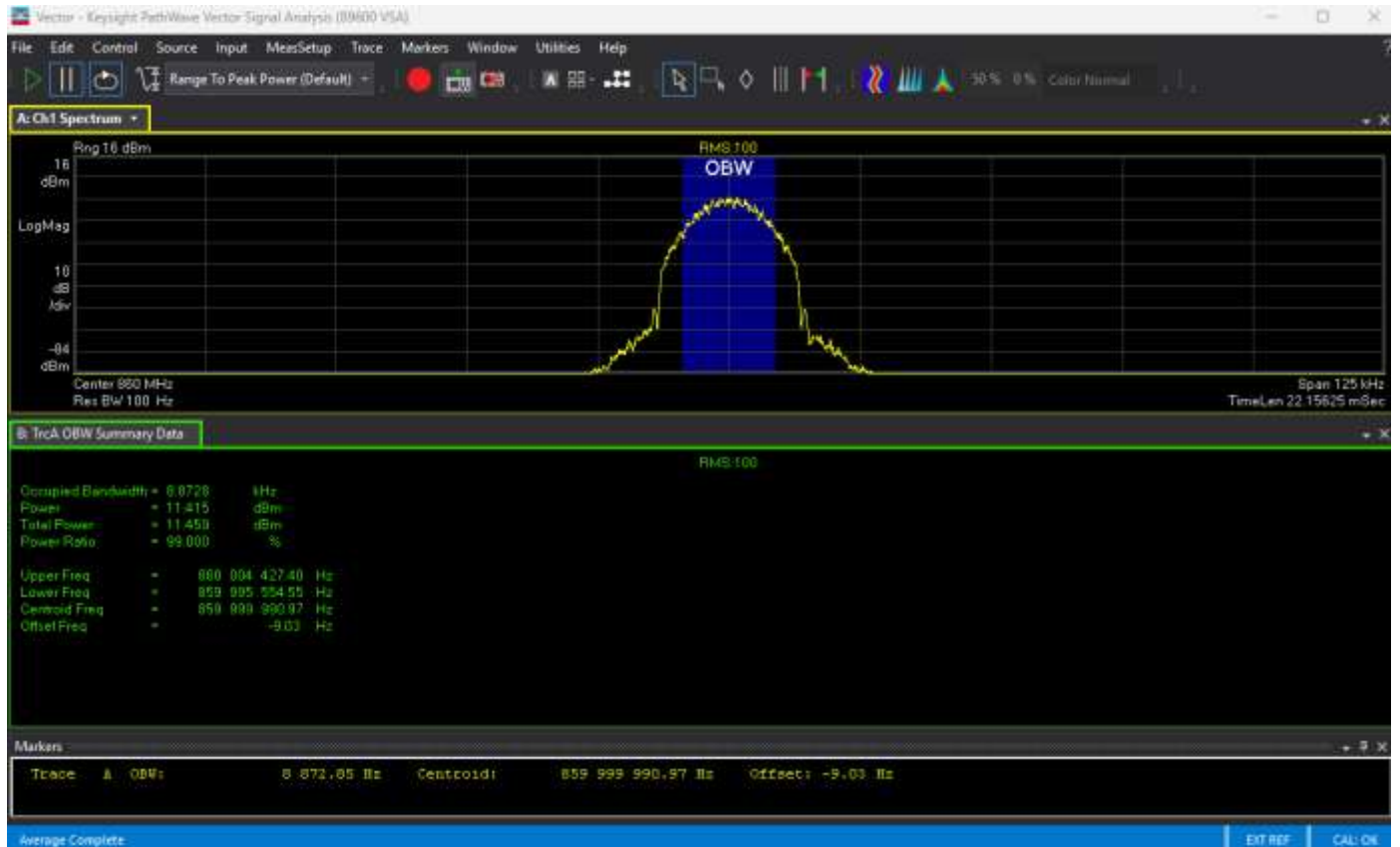
Resolution BW:	150 Hz
Span:	15 kHz
Number of Points:	1601
Integration Time:	14.8 ms

Test Procedure:

- 1) Adjust the spectrum analyzer per the values specified in the Emission Measurement Analyzer Settings.
- 2) Modulate the transmitter with the appropriate signaling pattern, (pseudorandom data) and key the transmitter at the full power rating. Allow the analyzer to sweep fully and store the sweep.
- 3) Use the band power marker function of the spectrum analyzer to measure the power of the carrier.
- 4) Use the carrier power value from the previous step to generate the emission mask limit.
- 5) Plot the resulting analyzer trace and the emission mask limit, add text and labeling as appropriate.
- 6) Adjust the signal analyzer resolution BW and span as indicated above, use the Occupied Bandwidth function to record the value.

EXHIBIT	DESCRIPTION	Meas Occ BW
E1-2.1	Occupied Bandwidth - Linear Simulcast Modulation (LSM), Low End of Band	8.93 kHz
E1-2.2	Occupied Bandwidth - Linear Simulcast Modulation (LSM), Middle of Band	8.90 kHz
E1-2.3	Occupied Bandwidth - Linear Simulcast Modulation (LSM), High End of Band	8.94 kHz

Report on Test Measurements



Report on Test Measurements**Occupied Bandwidth – Compatible 4-Level Frequency Modulation (C4FM), 12.5 kHz Channel Spacing**

C4FM can be used in a system configuration based upon channel usage as described in Exhibit B. The 'F1E' emission designator provides usage for telephony, the 'F1D' provides usage for data / telecommand, and the 'F1W' provides for usage as a combination. All are spectrally identical. The occupied bandwidth charts reference the following setup and specification requirements.

Modulation Type: Compatible 4-Level Frequency Modulation, C4FM
 Emission Designator: 8K10F1E, 8K10F1D, 8K10F1W
 Channelization: 12.5 kHz
 Power Setting: 90 Watts

Specification Requirement 47 CFR §90.210(d) and IC RSS-119 section 5.8.3 - Emission Limits – “D-Mask”:

Emission Mask D. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth (f_0) to 5.625 kHz removed from f_0 : *Zero dB*
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: *At least $7.27 * (f_d - 2.88 \text{ kHz})$ dB*
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: *At least 50 plus $10 \log_{10}(P)$ dB or 70 dB, whichever is the lesser attenuation.*
- (4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide to capture the true peak emission of the equipment under test. In order to show compliance with the emissions mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to ensure that the emission profile is developed.

Necessary Bandwidth Calculation:

The necessary bandwidth of the modulation per the formulas defined in 47 CFR §2.202(g) / TRC-43 section 8 is as follows:

Max Mod Freq, $M = \frac{1}{2}B$	Max Deviation, D	$2M + 2DK$ ($K=1$)	Nec BW
1.2 kHz	2.85 kHz	8.10 kHz	8K10

Measurement Procedure and Instrument Settings:**Emission Measurement Analyzer Settings**

Horizontal: 12.5 kHz per Division	Resolution BW: 100 Hz
Vertical: 10 dB per Division	Video BW: 10 kHz
Sweep Time: 72 Seconds (<2 kHz/Sec)	Span: 125 kHz
Detector: Peak	

Measured Occupied Bandwidth

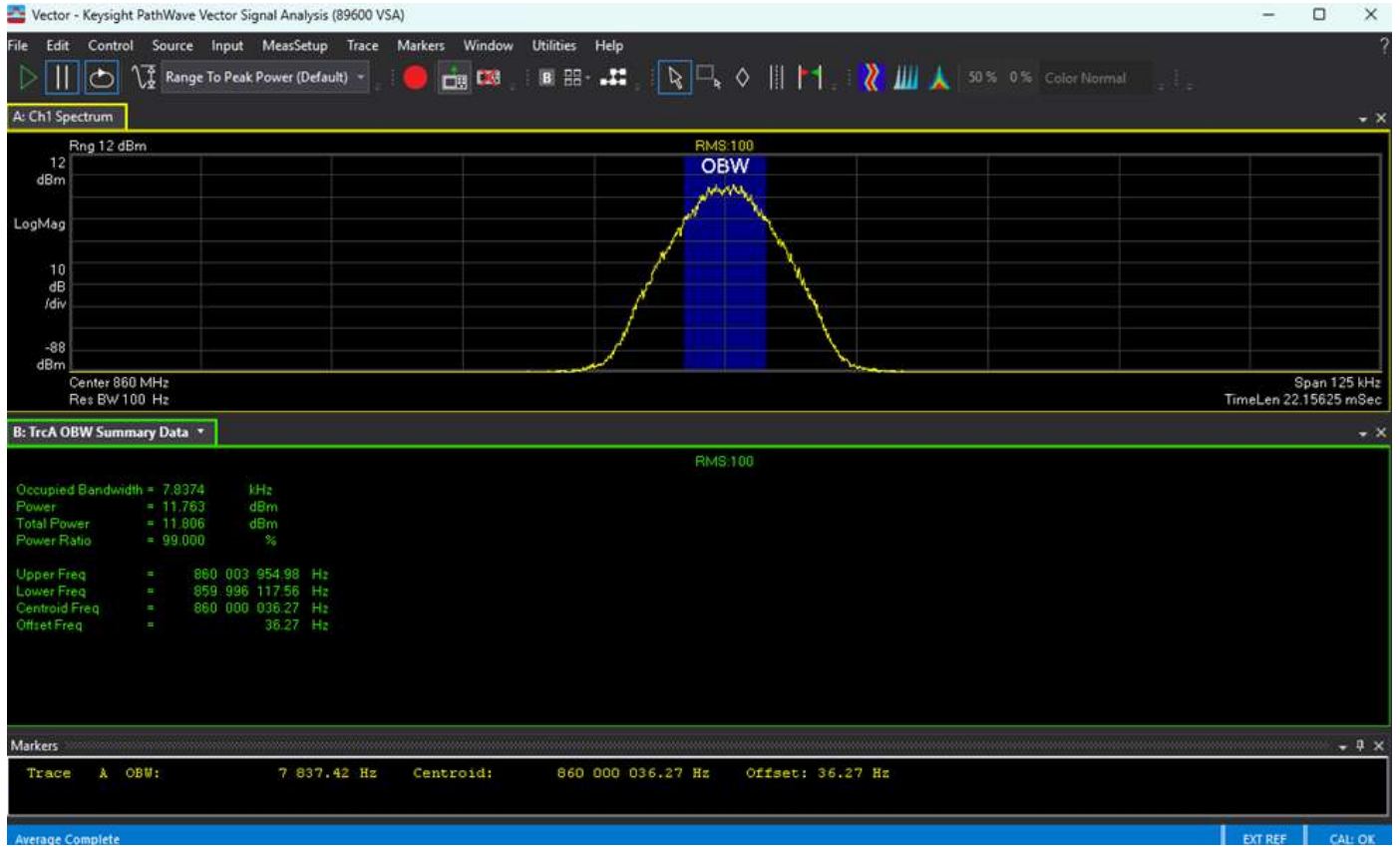
Resolution BW: 150 Hz
Span: 15 kHz
Number of Points: 1601
Integration Time: 14.8 ms

Test Procedure:

- 1) Adjust the spectrum analyzer per the values specified in the Emission Measurement Analyzer Settings.
- 2) Modulate the transmitter with the appropriate signaling pattern, (pseudorandom data) and key the transmitter at the full power rating. Allow the analyzer to sweep fully and store the sweep.
- 3) Use the band power marker function of the spectrum analyzer to measure the power of the carrier.
- 4) Use the carrier power value from the previous step to generate the emission mask limit.
- 5) Plot the resulting analyzer trace and the emission mask limit, add text and labeling as appropriate.
- 6) Adjust the signal analyzer resolution BW and span as indicated above, use the Occupied Bandwidth function to record the value.

EXHIBIT	DESCRIPTION	Meas Occ BW
E1-2.4	Occupied Bandwidth - Compatible 4-Level Frequency Mod (C4FM), Low End of Band	7.89 kHz
E1-2.5	Occupied Bandwidth - Compatible 4-Level Frequency Mod (C4FM), Middle of Band	7.83 kHz
E1-2.6	Occupied Bandwidth - Compatible 4-Level Frequency Mod (C4FM), High End of Band	7.86 kHz

Report on Test Measurements



Report on Test Measurements

Occupied Bandwidth –H-DQPSK, P25 Two Slot TDMA Digital Modulation, 12.5 kHz Channel Spacing

H-DQPSK modulation can be used in a system configuration based upon channel usage as described in Exhibit B. The 'D7E' emission designator provides usage for telephony, the 'D7D' provides usage for data / telecommand, and the 'D7W' provides for usage as a combination. All are spectrally identical. The occupied bandwidth charts reference the following setup and specification requirements.

Modulation Type: H-DQPSK, P25 Two Slot TDMA Digital Modulation
Emission Designator: 9K80D7E, 9K80D7D, 9K80D7W
Channelization: 12.5 kHz
Power Setting: 90 Watts, Average

Specification Requirement 47 CFR §90.210(d) and IC RSS-119 section 5.8.3 - Emission Limits – “D-Mask”:

Emission Mask D. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth (f_0) to 5.625 kHz removed from f_0 : *Zero dB*
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: *At least $7.27 * (f_d - 2.88 \text{ kHz})$ dB*
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: *At least 50 plus $10 \log_{10}(P)$ dB or 70 dB, whichever is the lesser attenuation.*
- (4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide to capture the true peak emission of the equipment under test. In order to show compliance with the emissions mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to ensure that the emission profile is developed.

Necessary Bandwidth Calculation: The necessary bandwidth of the modulation signal is not directly calculable per the composite modulation formulas defined in 47 CFR §2.202(g) / TRC-43 section 8. Quadrature Phase Shift Keying is used to modulate a carrier with a digital bit stream: Data Rate: $R = 12000$ bps; Bits per Symbol: $S=4$; $B_n = 2BK$; $B = R/\log_2(s) = 12000/\log_2(4) = 6000$; $K= 0.81$; $B_n = 2*6000*0.81$; $B_n = 9800$ Hz. The necessary bandwidth of 9.80 kHz is based on a 99% power measurement of the transmitter spectrum, per §2.202(a) / TRC-43 section 7(c).

Measurement Procedure and Instrument Settings:

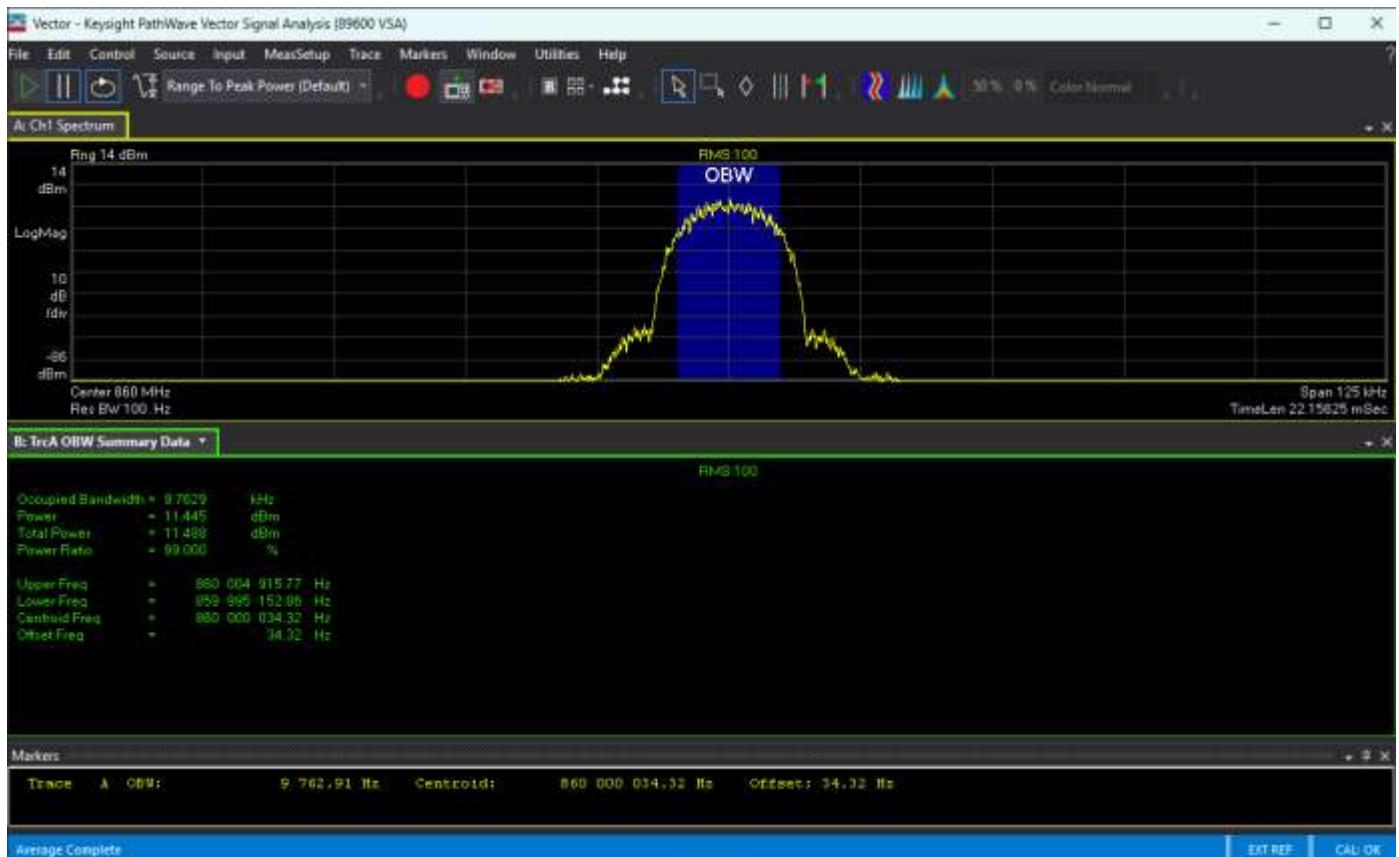
Emission Measurement Analyzer Settings				Measured Occupied Bandwidth	
Horizontal:	12.5 kHz per Division	Resolution BW:	100 Hz	Resolution BW:	150 Hz
Vertical:	10 dB per Division	Video BW:	10 kHz	Span:	15 kHz
Sweep Time:	72 Seconds (<2 kHz/Sec)	Span:	125 kHz	Number of Points:	1601
Detector:	Peak			Integration Time:	14.8 ms

Test Procedure:

- 1) Adjust the spectrum analyzer per the values specified in the Emission Measurement Analyzer Settings.
- 2) Modulate the transmitter with the appropriate signaling pattern, (pseudorandom data) and key the transmitter at the full power rating. Allow the analyzer to sweep fully and store the sweep.
- 3) Use the band power marker function of the spectrum analyzer to measure the power of the carrier.
- 4) Use the carrier power value from the previous step to generate the emission mask limit.
- 5) Plot the resulting analyzer trace and the emission mask limit, add text and labeling as appropriate.
- 6) Adjust the signal analyzer resolution BW and span as indicated above, use the Occupied Bandwidth function to record the value.

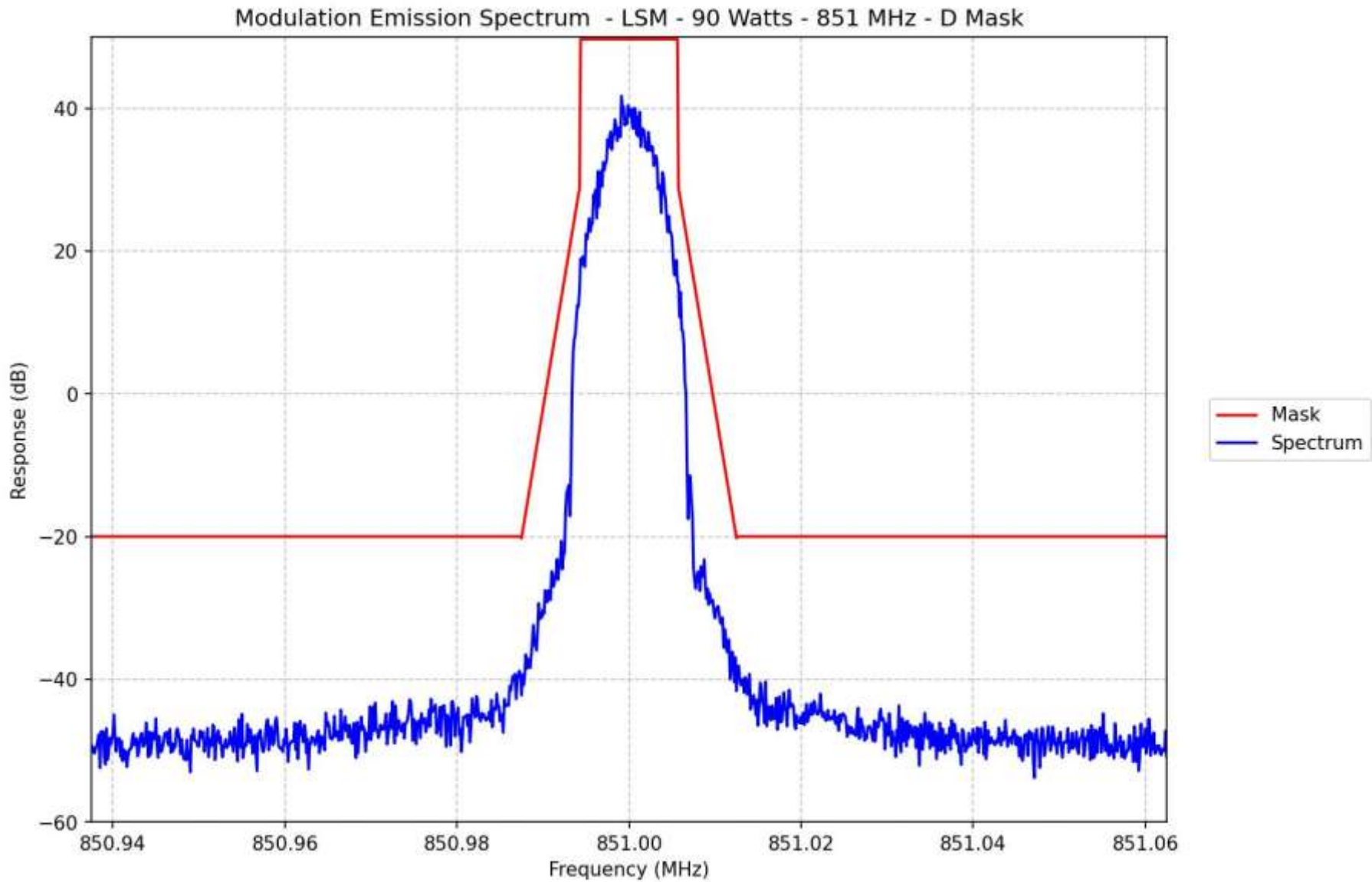
EXHIBIT	DESCRIPTION	Meas Occ BW
E1-2.7	Occupied Bandwidth - H-DQPSK P25 Two Slot TDMA Digital Mod, Low End of Band	9.81 kHz
E1-2.8	Occupied Bandwidth - H-DQPSK P25 Two Slot TDMA Digital Mod, Middle of Band	9.80 kHz
E1-2.9	Occupied Bandwidth - H-DQPSK P25 Two Slot TDMA Digital Mod, High End of Band	9.80 kHz

Report on Test Measurements



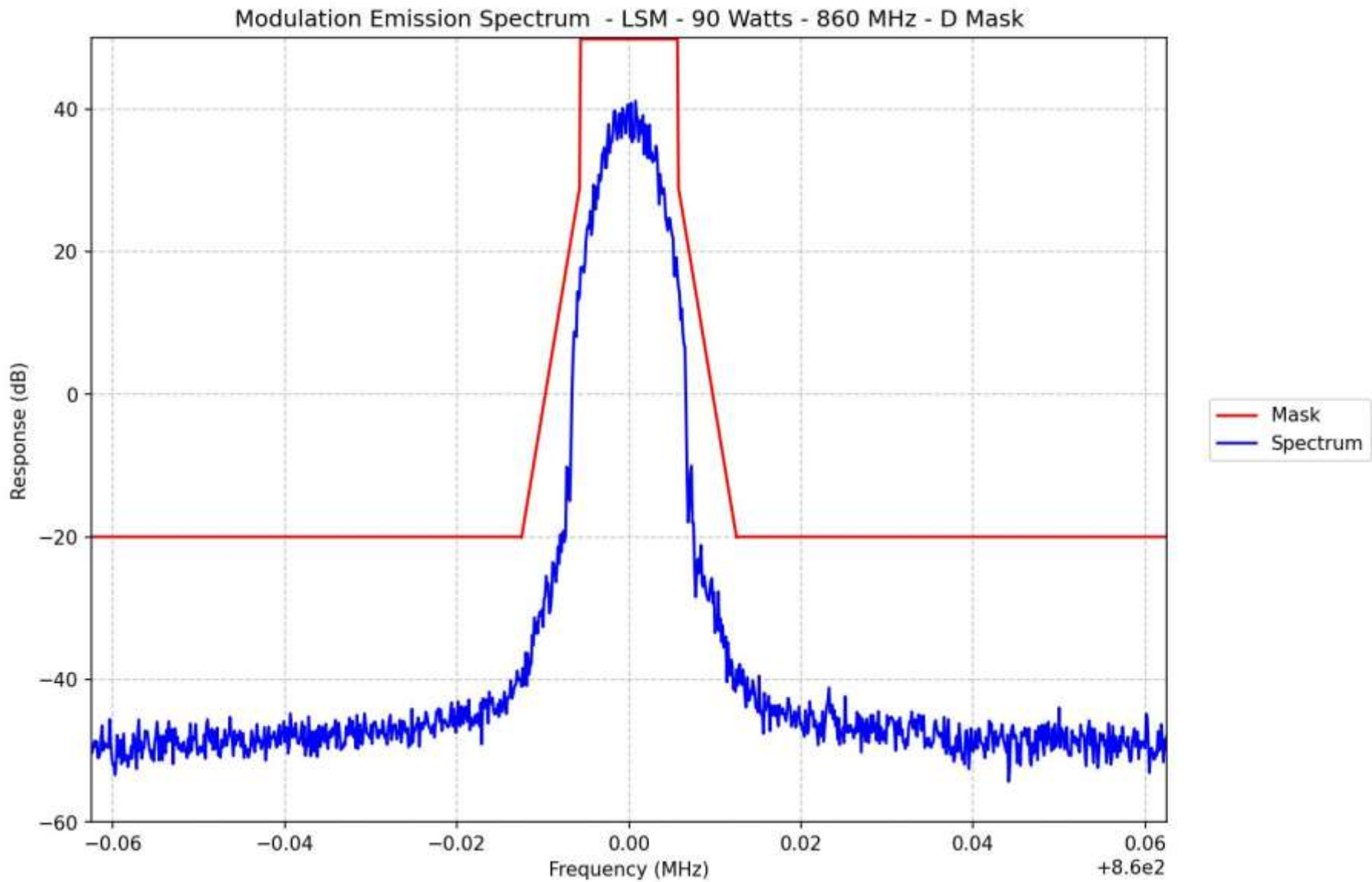
Report on Test Measurements

Occupied Bandwidth – Linear Simulcast Modulation (LSM) – Emission Designator: 8K70D1E, 8K70D1D, 8K70D1W – Low End of Band



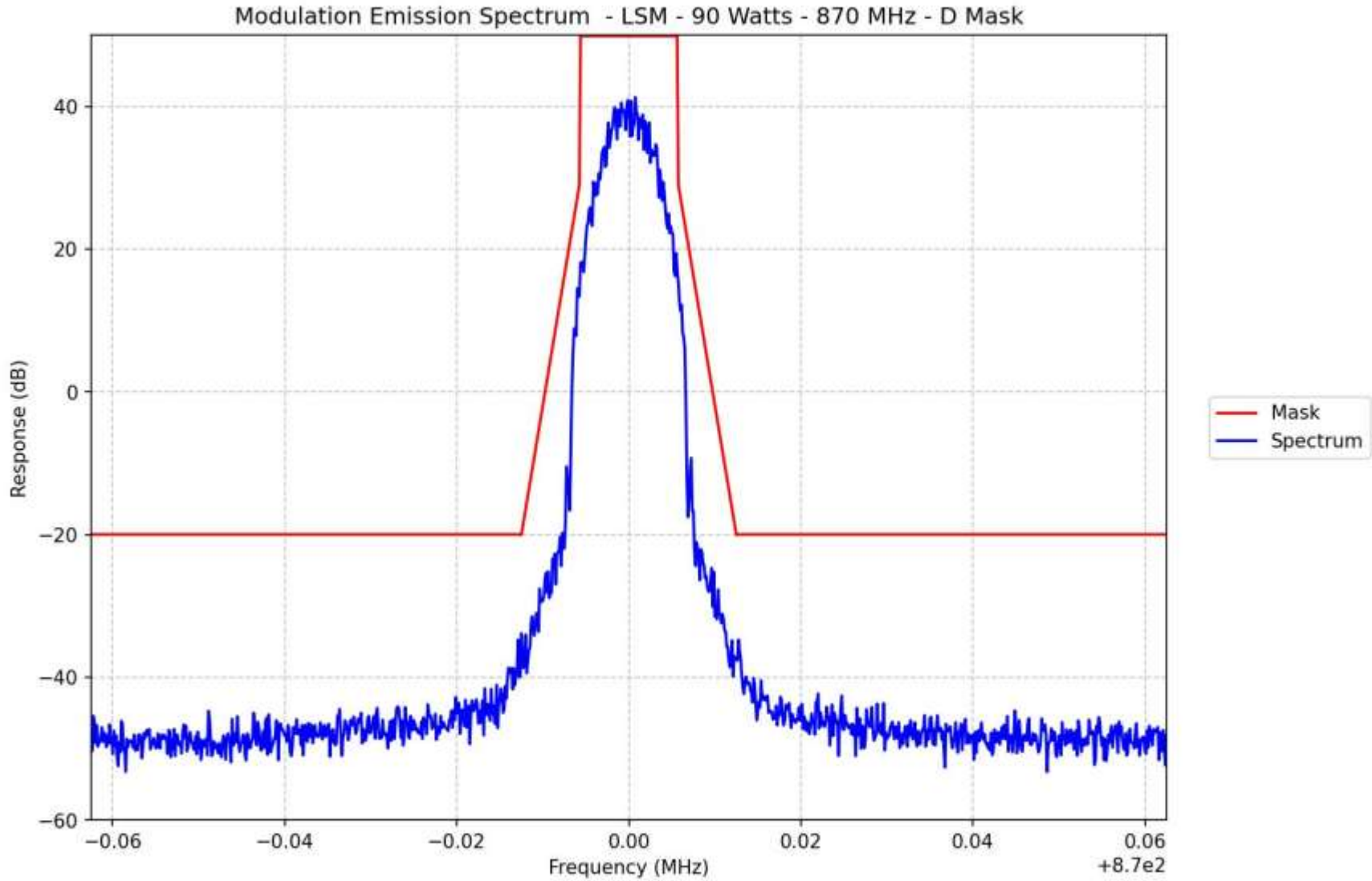
Report on Test Measurements

Occupied Bandwidth – Linear Simulcast Modulation (LSM) – Emission Designator: 8K70D1E, 8K70D1D, 8K70D1W – Middle of Band



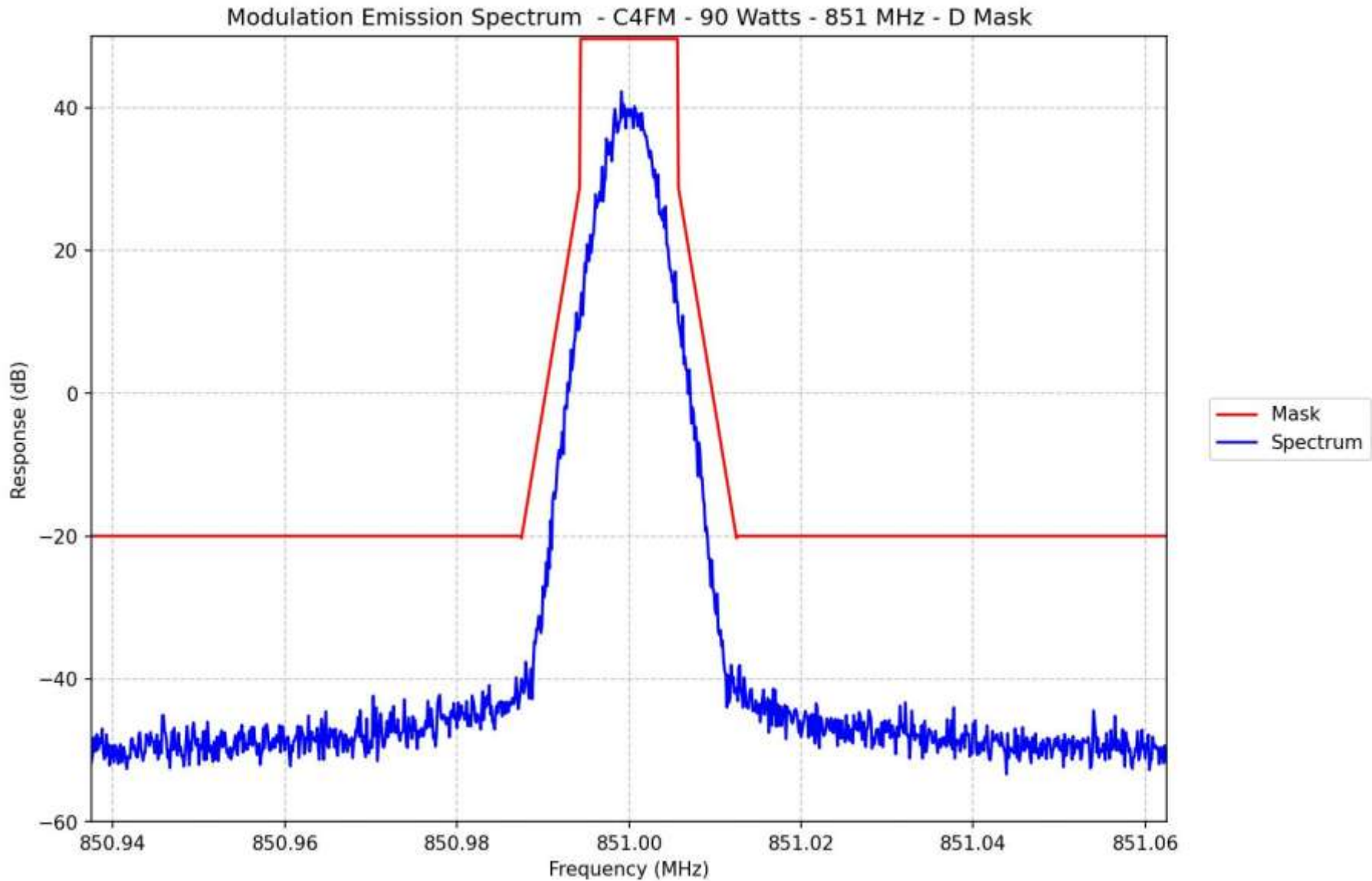
Report on Test Measurements

Occupied Bandwidth – Linear Simulcast Modulation (LSM) – Emission Designator: 8K70D1E, 8K70D1D, 8K70D1W – High End of Band



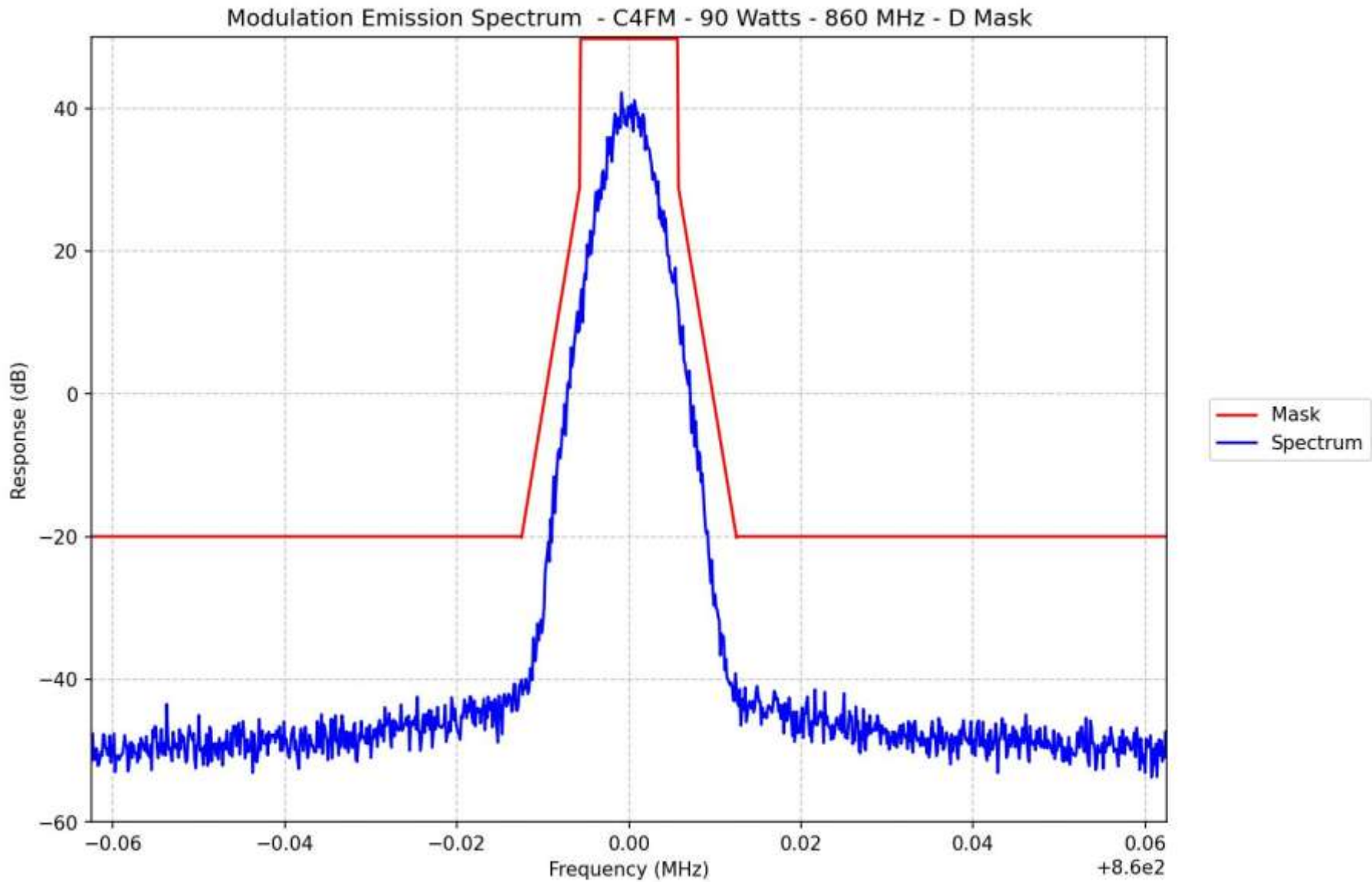
Report on Test Measurements

Occupied Bandwidth – Compatible 4-Level Frequency Modulation (C4FM) – Emission Designator: 8K10D1E, 8K10D1D, 8K10D1W, Low End of Band



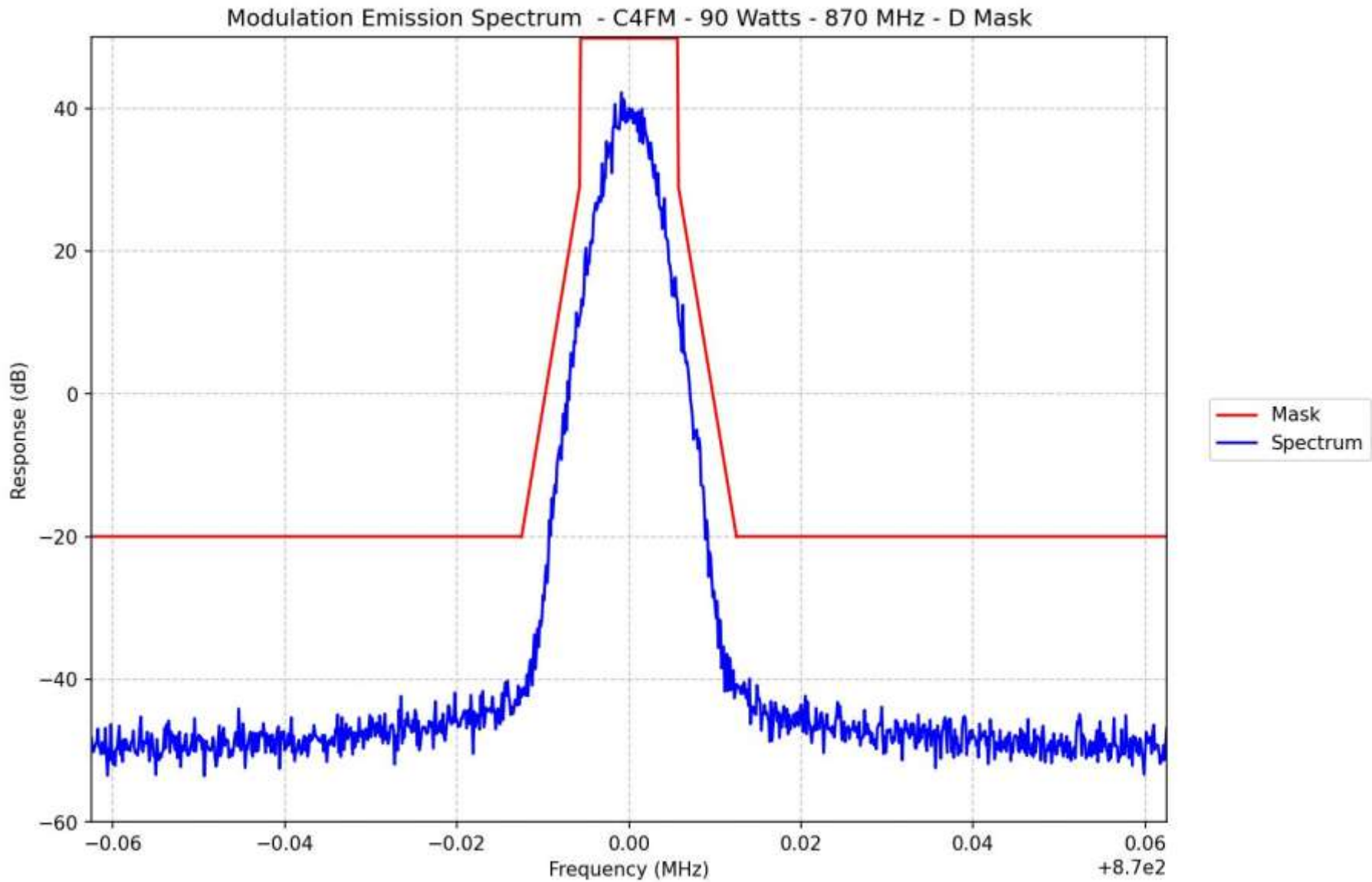
Report on Test Measurements

Occupied Bandwidth – Compatible 4-Level Frequency Modulation (C4FM) – Emission Designator: 8K10D1E, 8K10D1D, 8K10D1W, Middle of Band



Report on Test Measurements

Occupied Bandwidth – Compatible 4-Level Frequency Modulation (C4FM) – Emission Designator: 8K10D1E, 8K10D1D, 8K10D1W, High End of Band

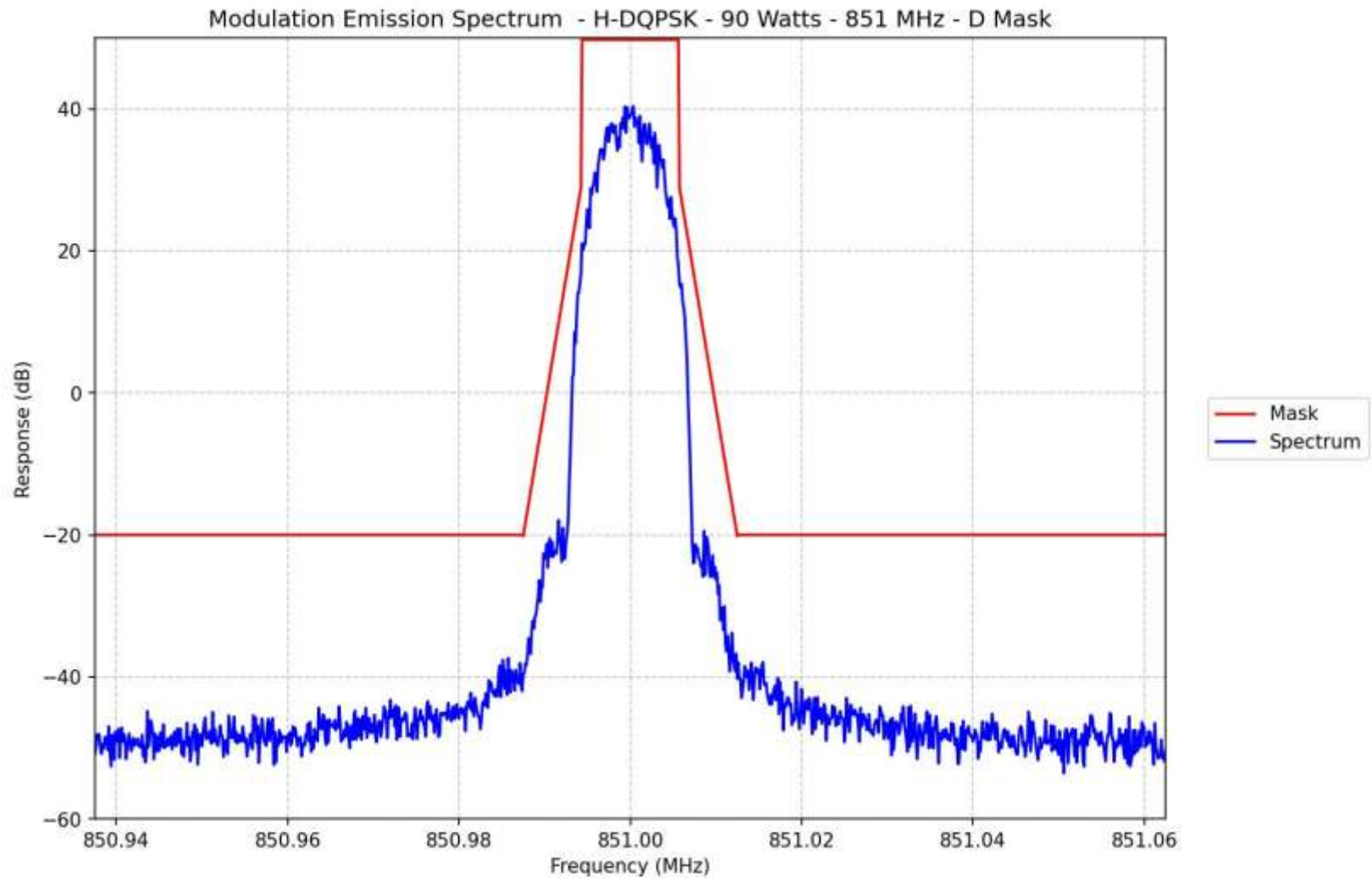


APPLICANT: MOTOROLA SOLUTIONS

EQUIPMENT TYPE: ABZ89FT5902
109AB-T5902

Report on Test Measurements

Occupied Bandwidth – H-DQPSK, P25 Two Slot TDMA Digital Modulation – Emission Designator: 9K80D7E, 9K80D7D, 9K80D7W, Low End of Band

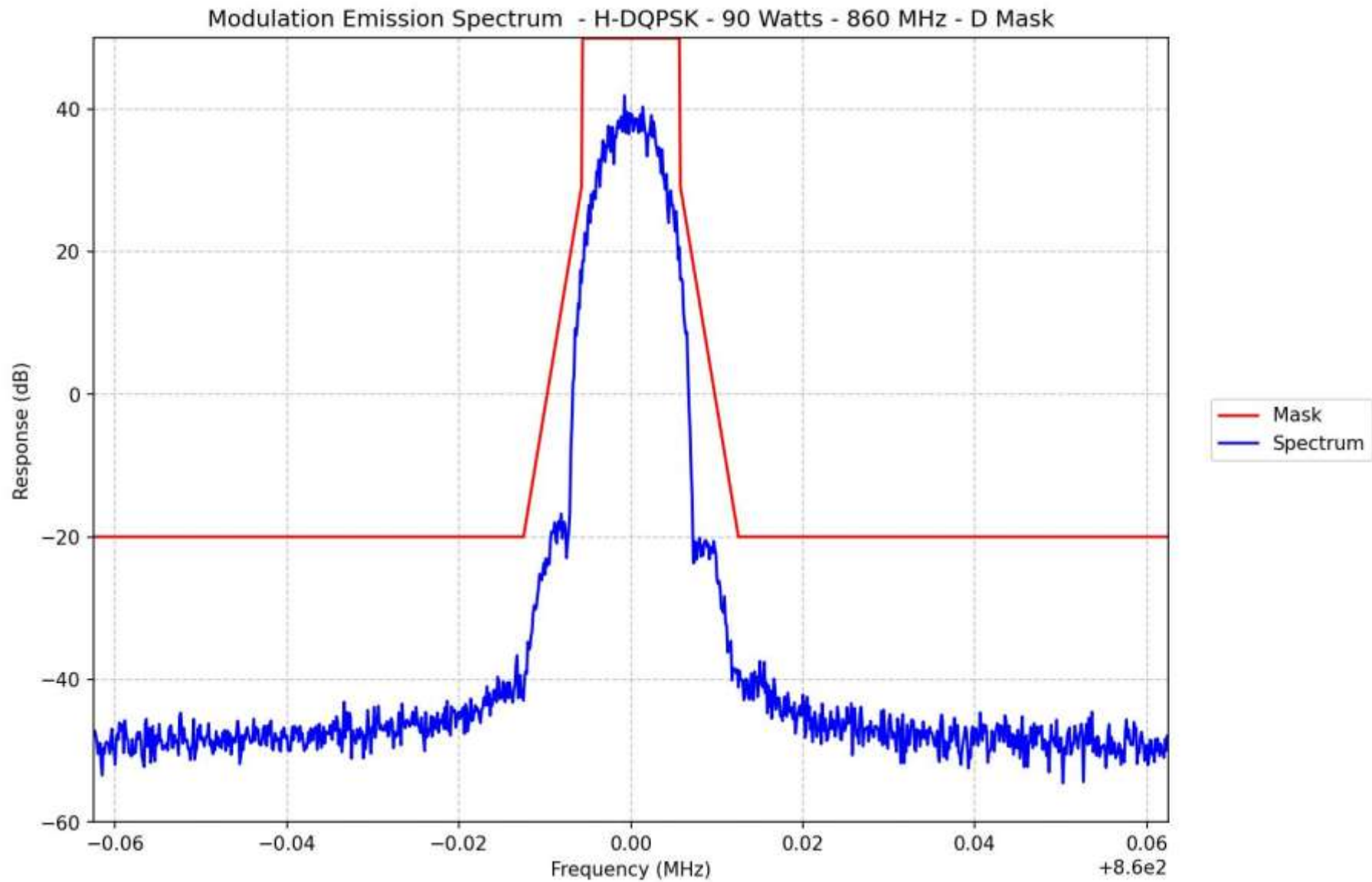


APPLICANT: MOTOROLA SOLUTIONS

EQUIPMENT TYPE: ABZ89FT5902
109AB-T5902

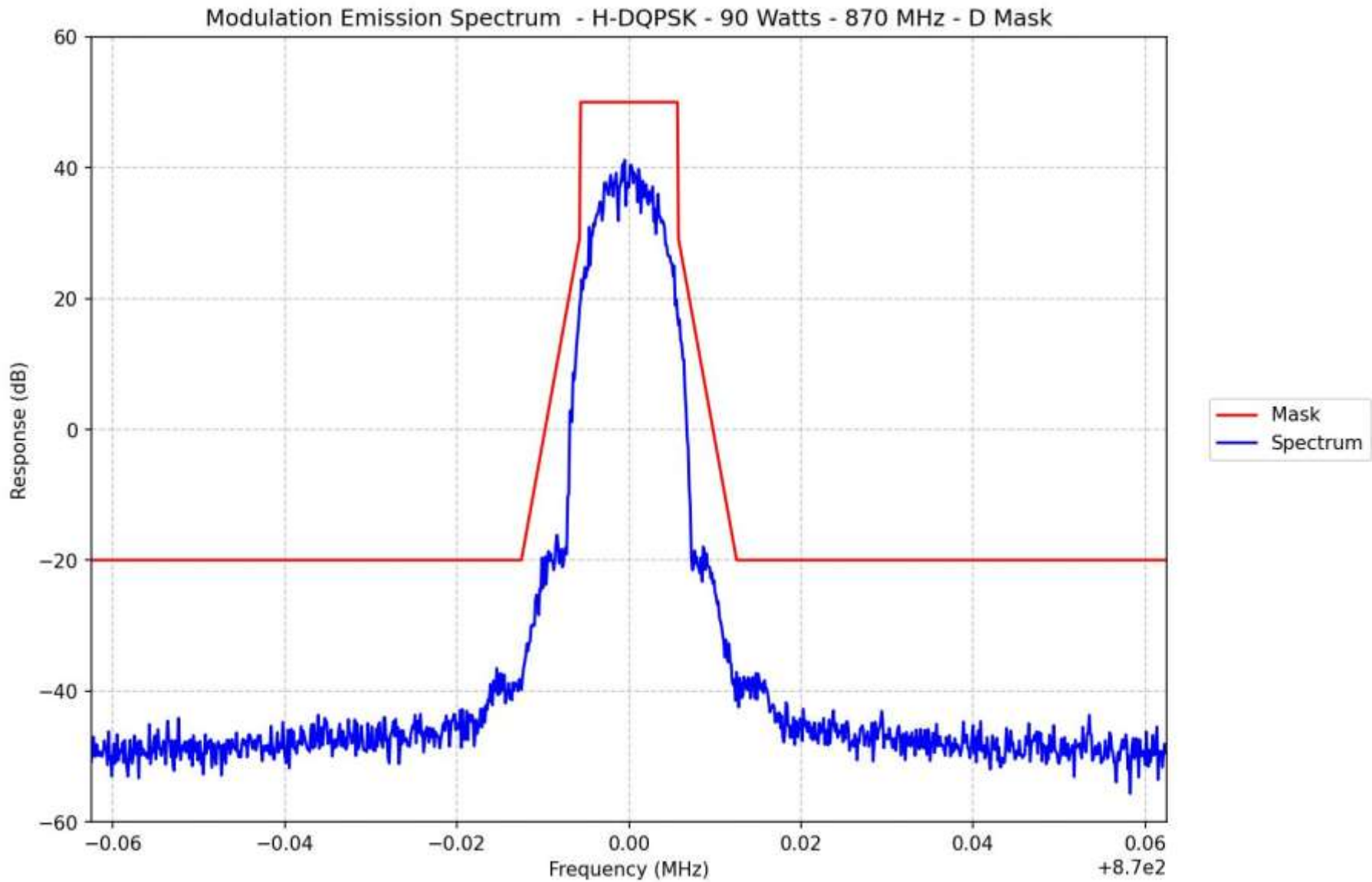
Report on Test Measurements

Occupied Bandwidth – H-DQPSK, P25 Two Slot TDMA Digital Modulation – Emission Designator: 9K80D7E, 9K80D7D, 9K80D7W, Middle of Band



Report on Test Measurements

Occupied Bandwidth – H-DQPSK, P25 Two Slot TDMA Digital Modulation – Emission Designator: 9K80D7E, 9K80D7D, 9K80D7W, High End of Band



Report on Test Measurements

Conducted Spurious Emissions – Harmonics and Emission Spectrum

Specification Requirement 47 CFR §90.210(d) and IC RSS-119 section 5.8.3 - Emission Limits – “D-Mask”:

Emission Mask D: For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz:
- At least 50 plus $10 \log_{10}(P)$ dB or 70 dB, whichever is the lesser attenuation.*

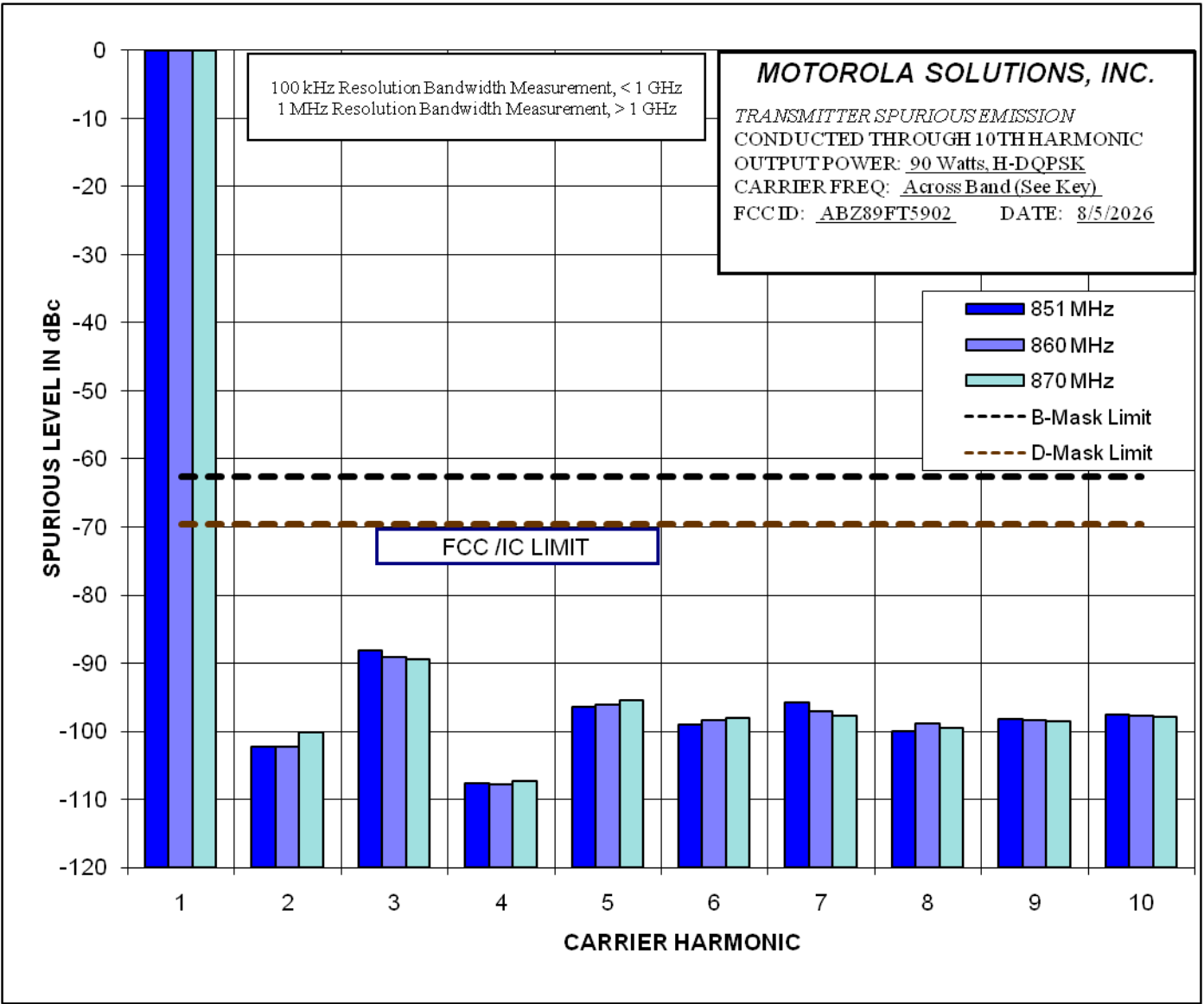
Modulation: Linear Simulcast Modulation (LSM), Compatible 4-Level Frequency Modulation (C4FM) or P25 Two Slot TDMA Digital Modulation (H-DQPSK) as indicated

Carrier Frequencies: Carrier frequencies of 851, 860, and 870 MHz were measured for conducted carrier harmonics and conducted emission. These frequencies represent the low end, center, and high end of the 851-870 MHz band, and are representative of the full operating band.

EXHIBIT	DESCRIPTION
E1-3.1	Conducted Spurious Harmonic Emissions, Power Output 90 Watts (Average), LSM The specification limit is -69.5 dBc (-20dBm)
E1-3.2	Conducted Spurious Harmonic Emissions, Power Output 2 Watts (Average), LSM The specification limit is -53.0 dBc (-20dBm)
E1-3.3	Conducted Spurious Harmonic Emissions, Power Output 90 Watts, C4FM The specification limit is -69.5 dBc (-20dBm)
E1-3.4	Conducted Spurious Harmonic Emissions, Power Output 2 Watts, C4FM The specification limit is -53.0 dBc (-20dBm)
E1-3.5	Conducted Spurious Harmonic Emissions, Power Output 90 Watts, H-DQPSK The specification limit is -69.5 dBc (-20dBm)
E1-3.6	Conducted Spurious Harmonic Emissions, Power Output 2 Watts, H-DQPSK The specification limit is -53.0 dBc (-20dBm)
E1-3.7, 8, 9	Conducted Spurious Emission Spectrum, 200 MHz Span, Power Output at 90 Watts, LSM The specification limit is -69.5 dBc (-20dBm)
E1-3.10, 11, 12	Conducted Spurious Emission Spectrum, 200 MHz Span, Power Output at 90 Watts, C4FM The specification limit is -69.5dBc (-20dBm)
E1-3.13,14, 15	Conducted Spurious Emission Spectrum, 200 MHz Span, Power Output at 90 Watts, H-DQPSK The specification limit is -69.5dBc (-20dBm)

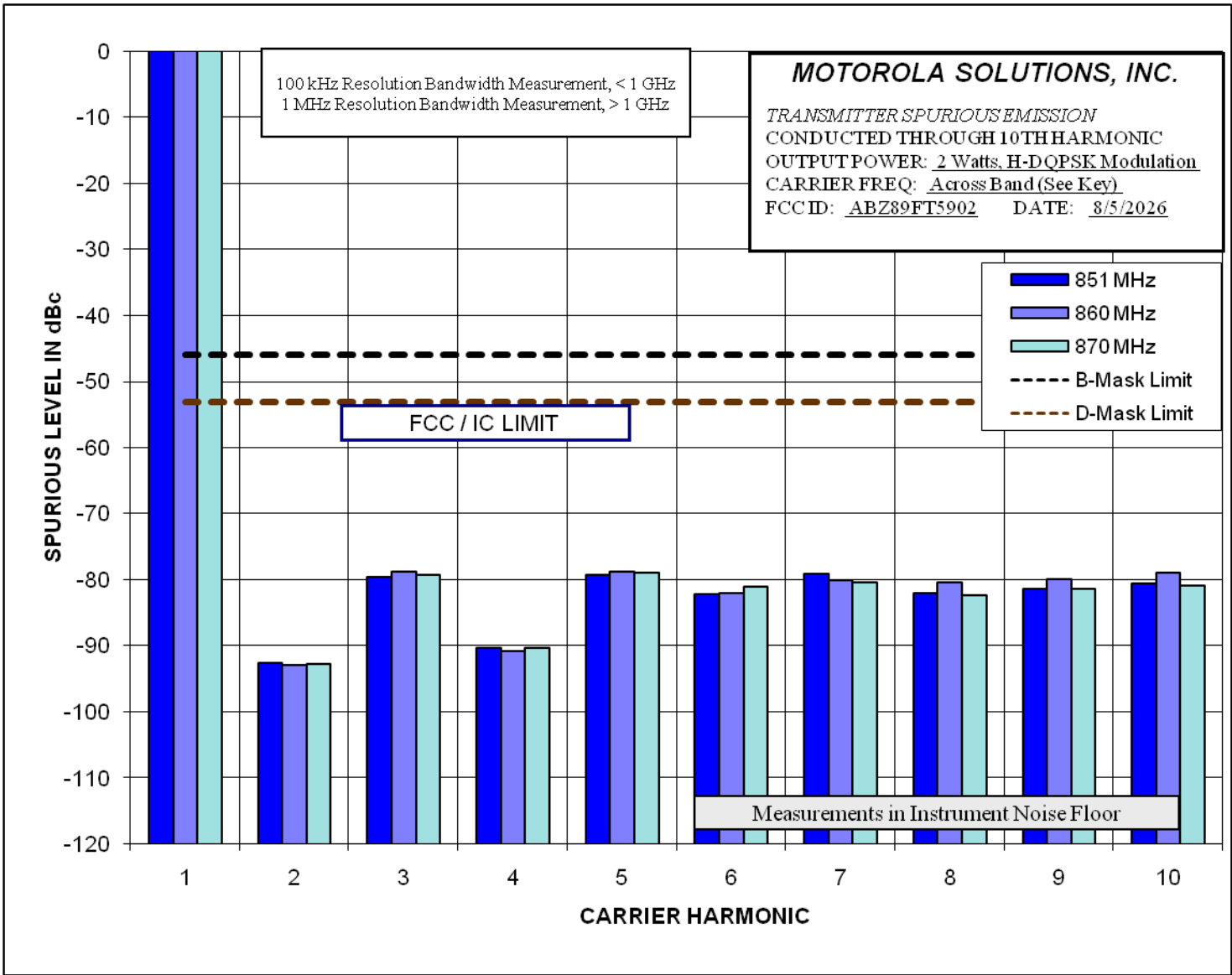
Report on Test Measurements

Conducted Spurious Harmonic Emissions – 90 Watts (Average) LSM



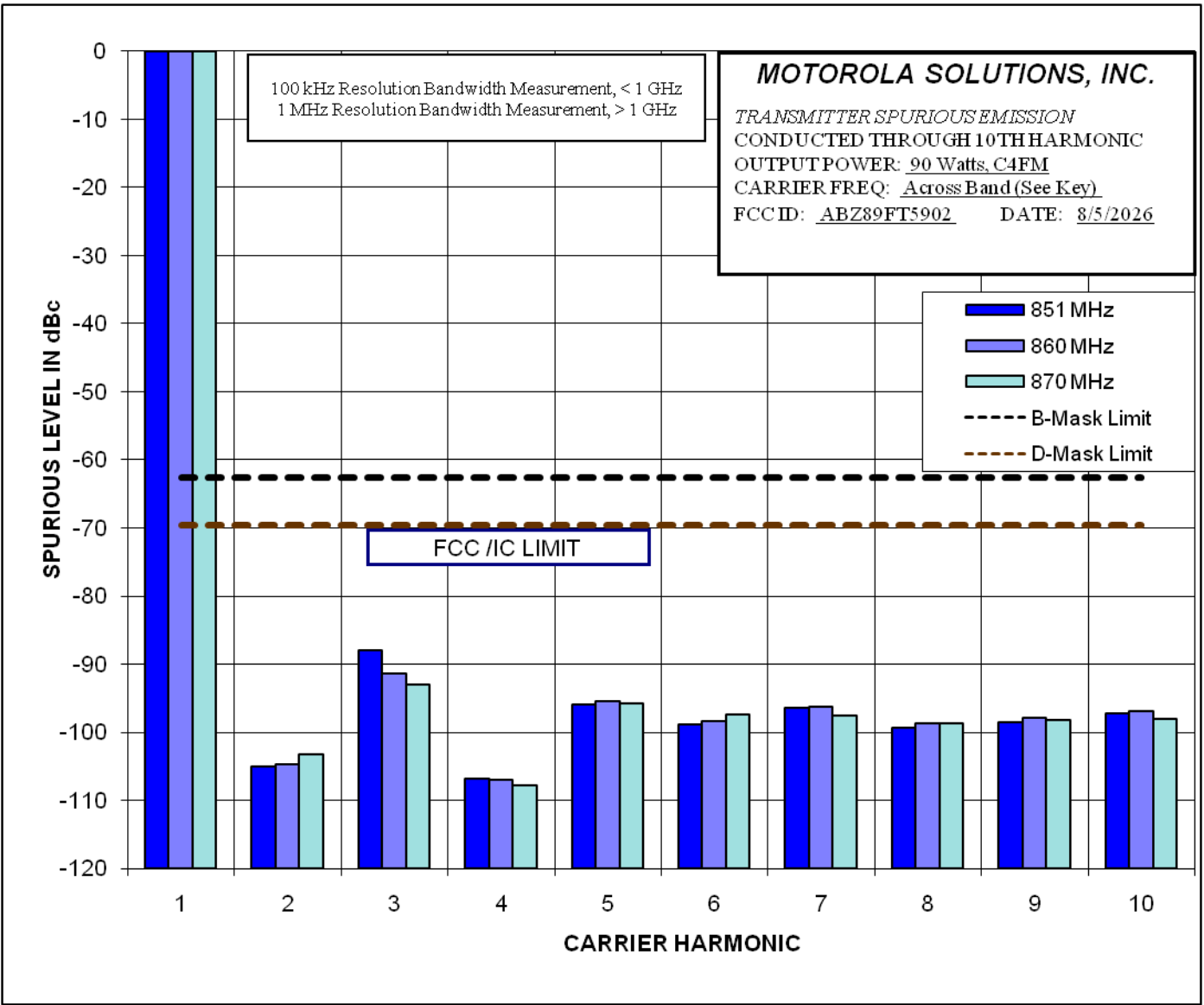
Report on Test Measurements

Conducted Spurious Harmonic Emissions – 2 Watts (Average) LSM



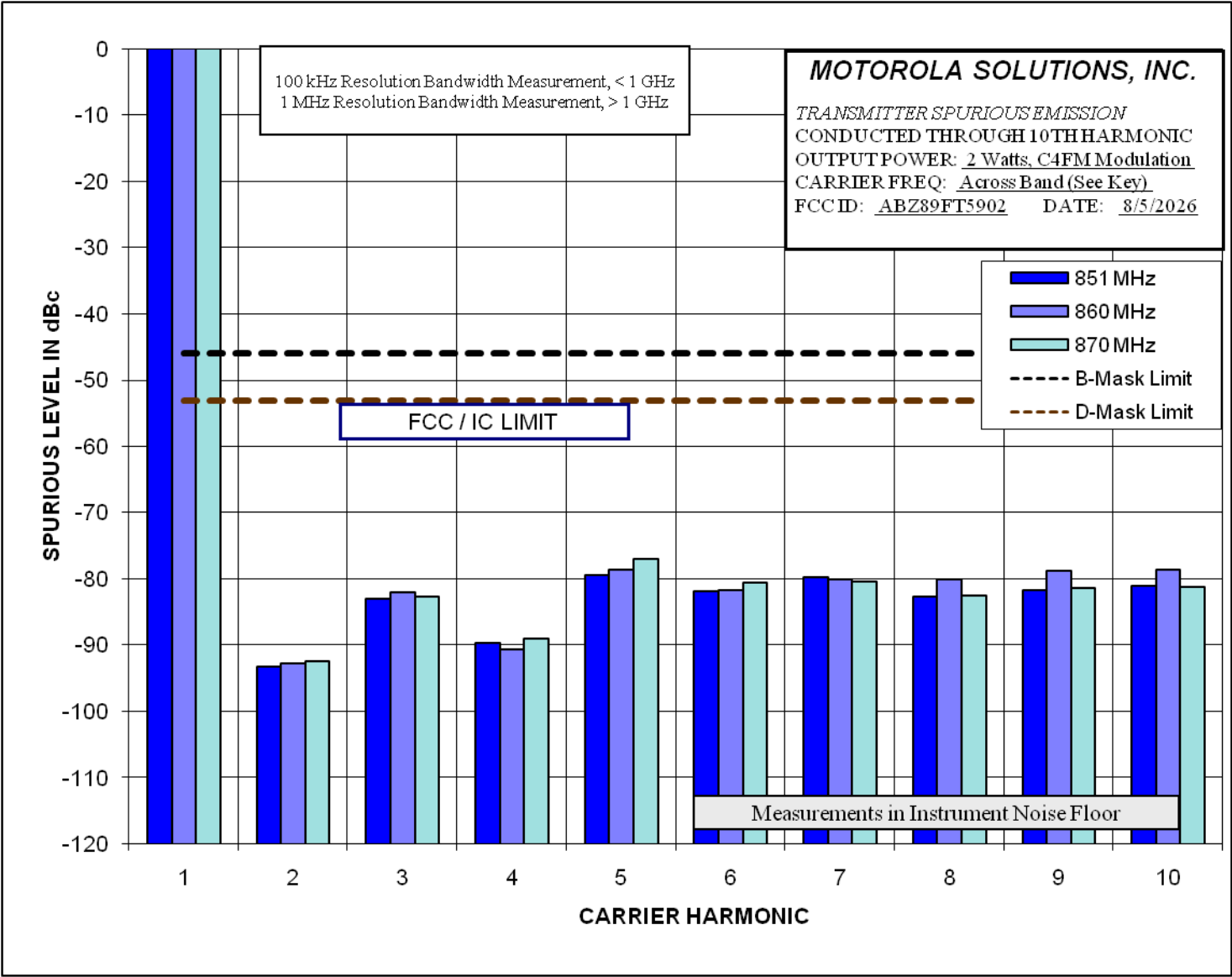
Report on Test Measurements

Conducted Spurious Harmonic Emissions – 90 Watts C4FM



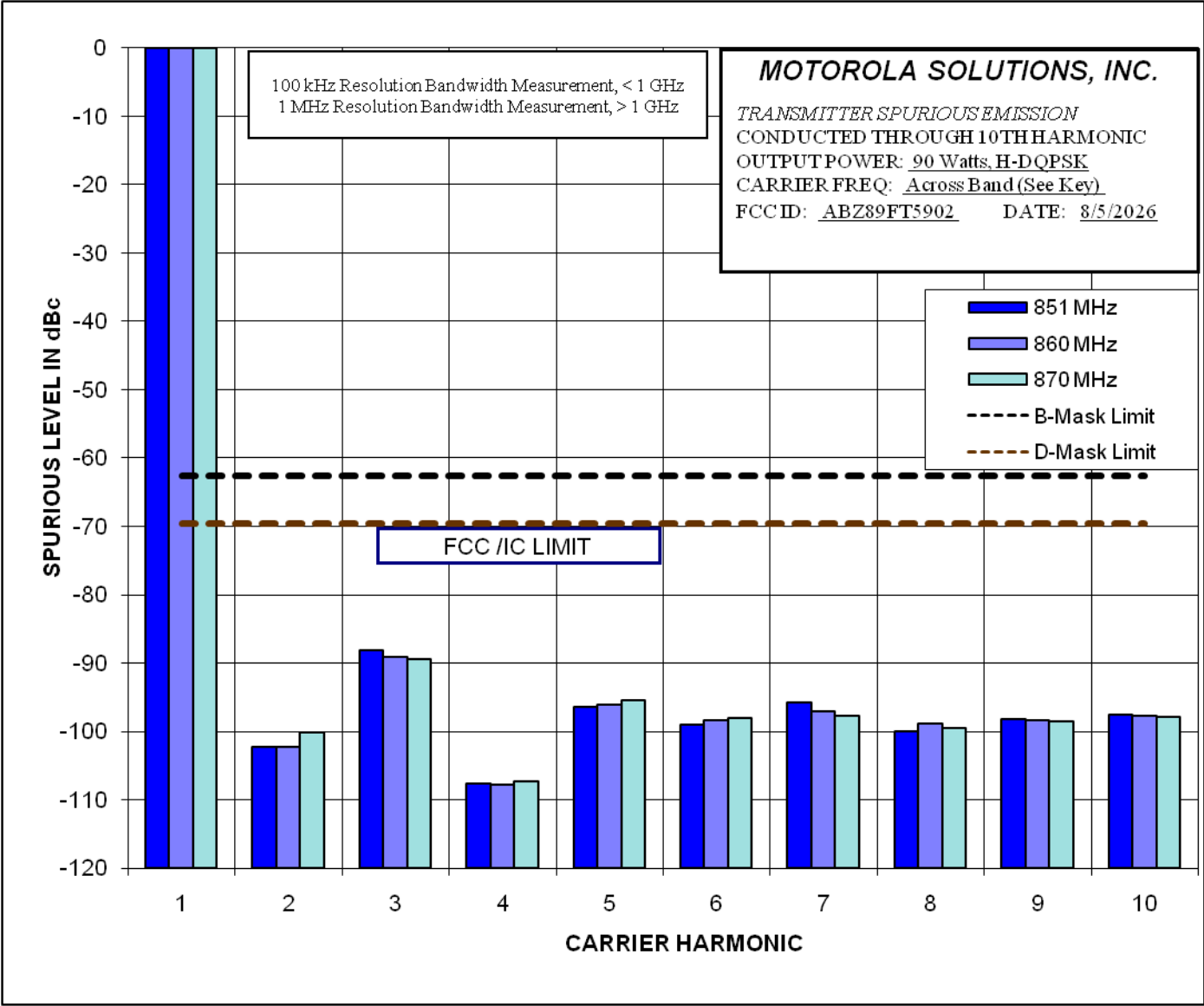
Report on Test Measurements

Conducted Spurious Harmonic Emissions – 2 Watts C4FM



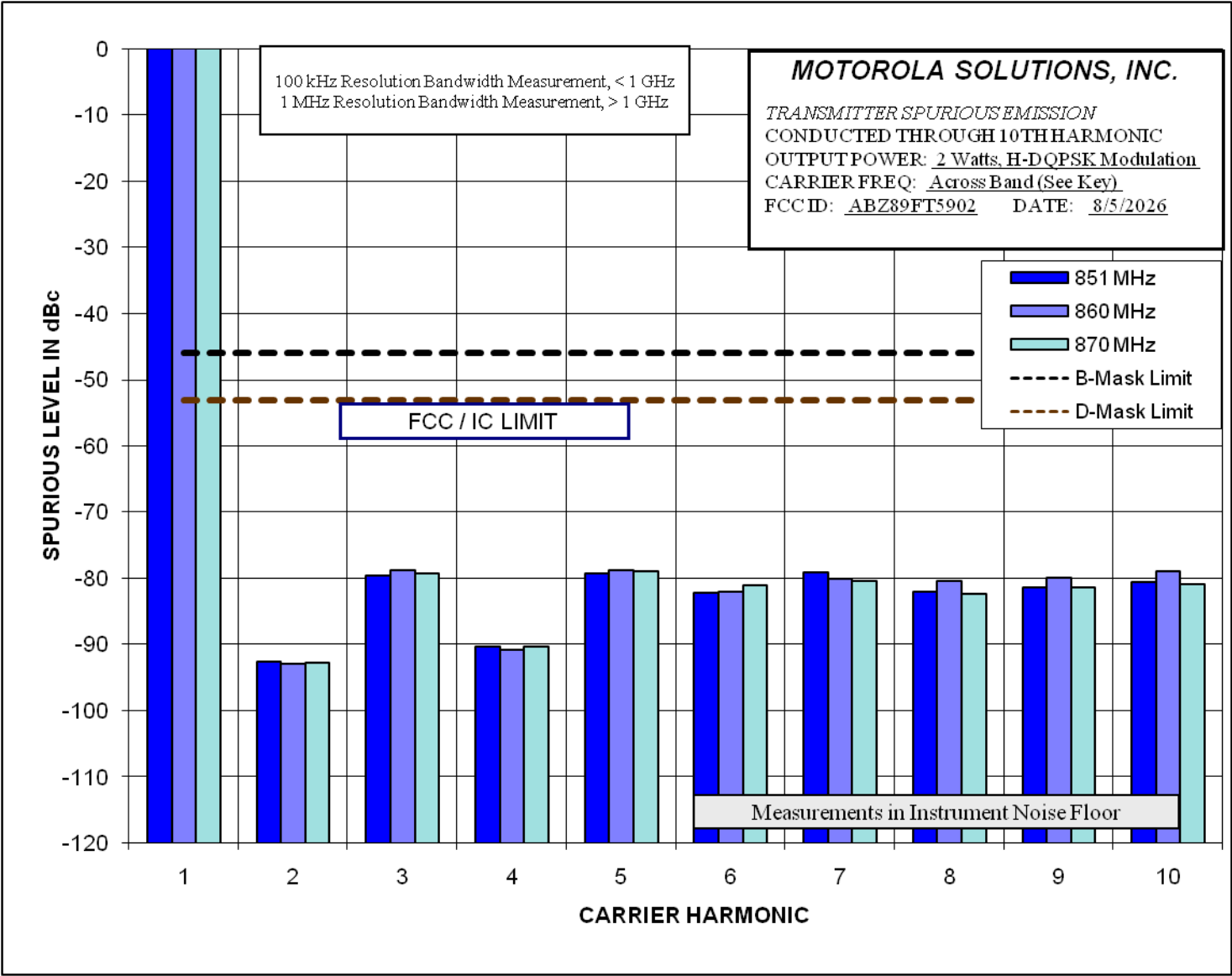
Report on Test Measurements

Conducted Spurious Harmonic Emissions – 90 Watts H-DQPSK



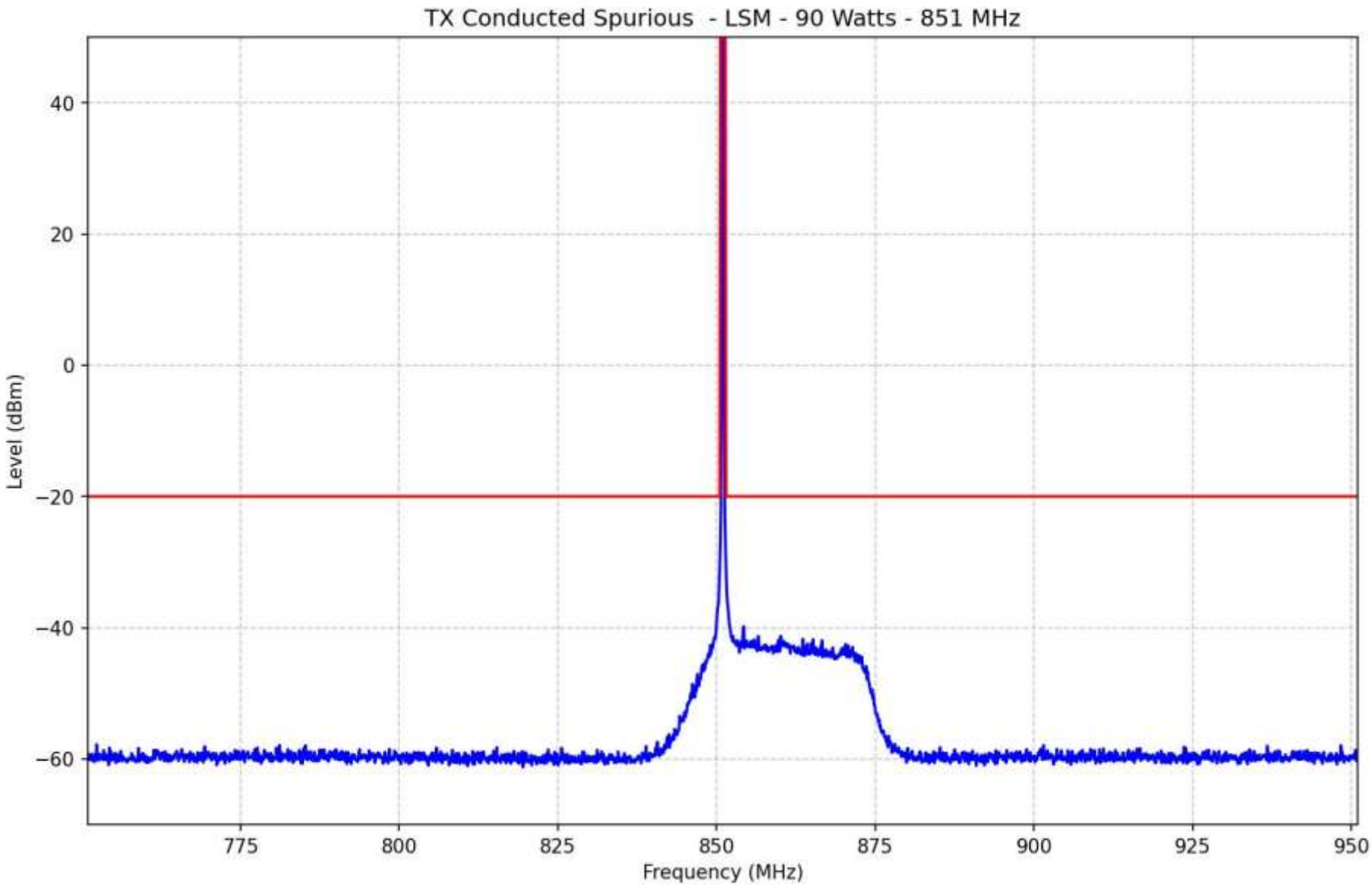
Report on Test Measurements

Conducted Spurious Harmonic Emissions – 2 Watts H-DQPSK



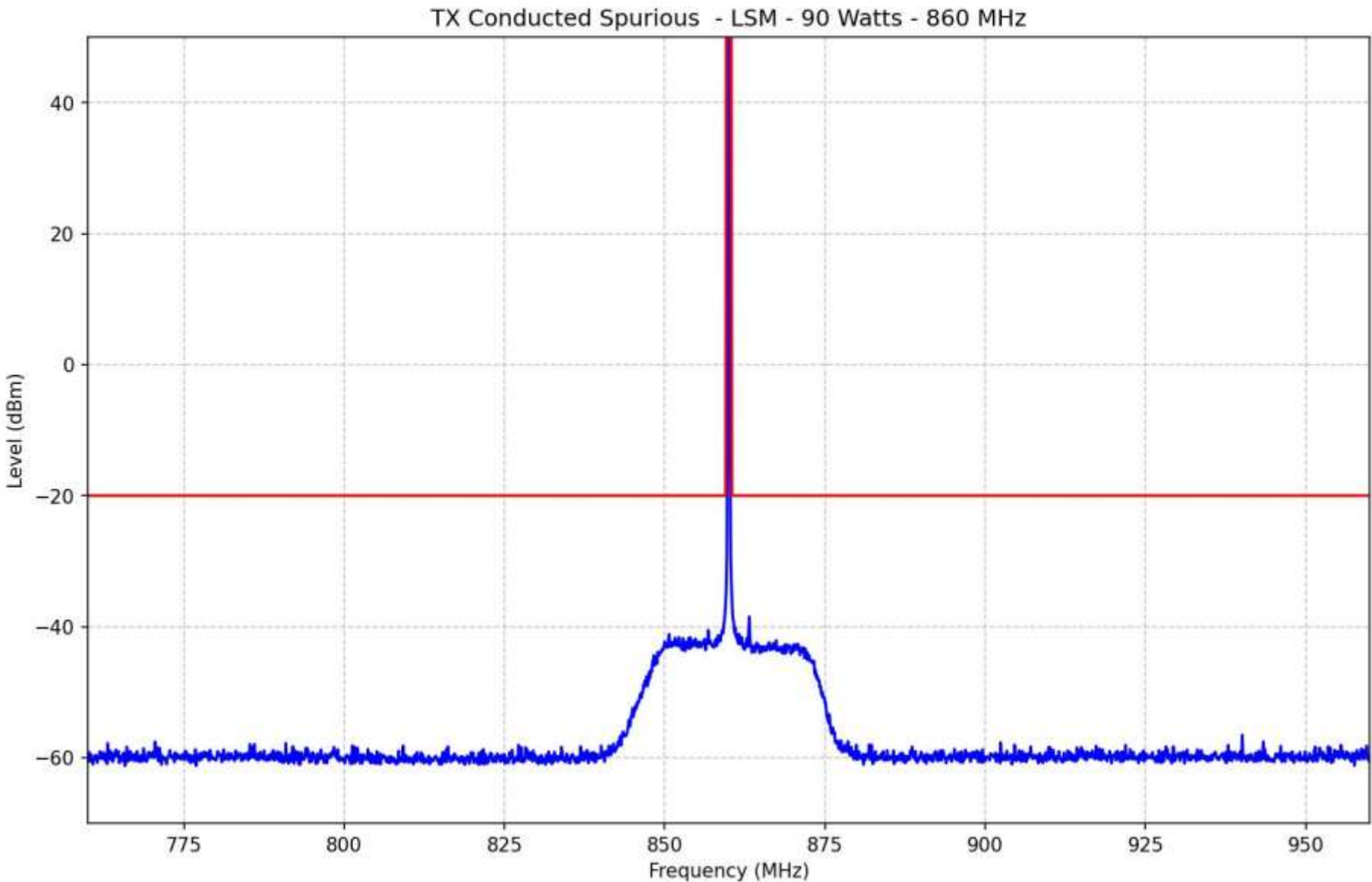
Report on Test Measurements

Conducted Spurious Emission Spectrum – 90Watts (Average) LSM – 200 MHz Span – Low End of Band



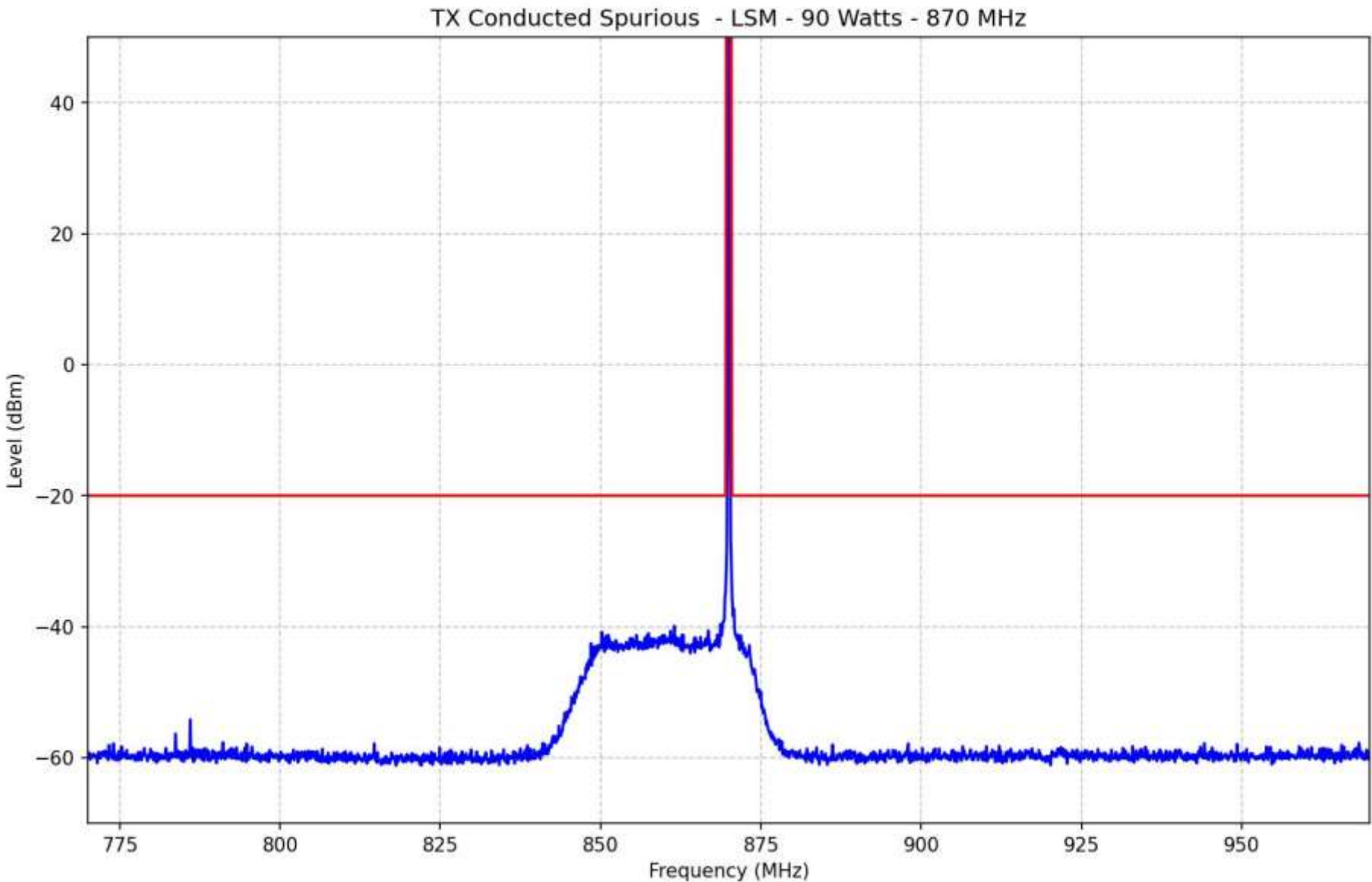
Report on Test Measurements

Conducted Spurious Emission Spectrum – 90 Watts (Average) LSM – 200 MHz Span – Middle of Band



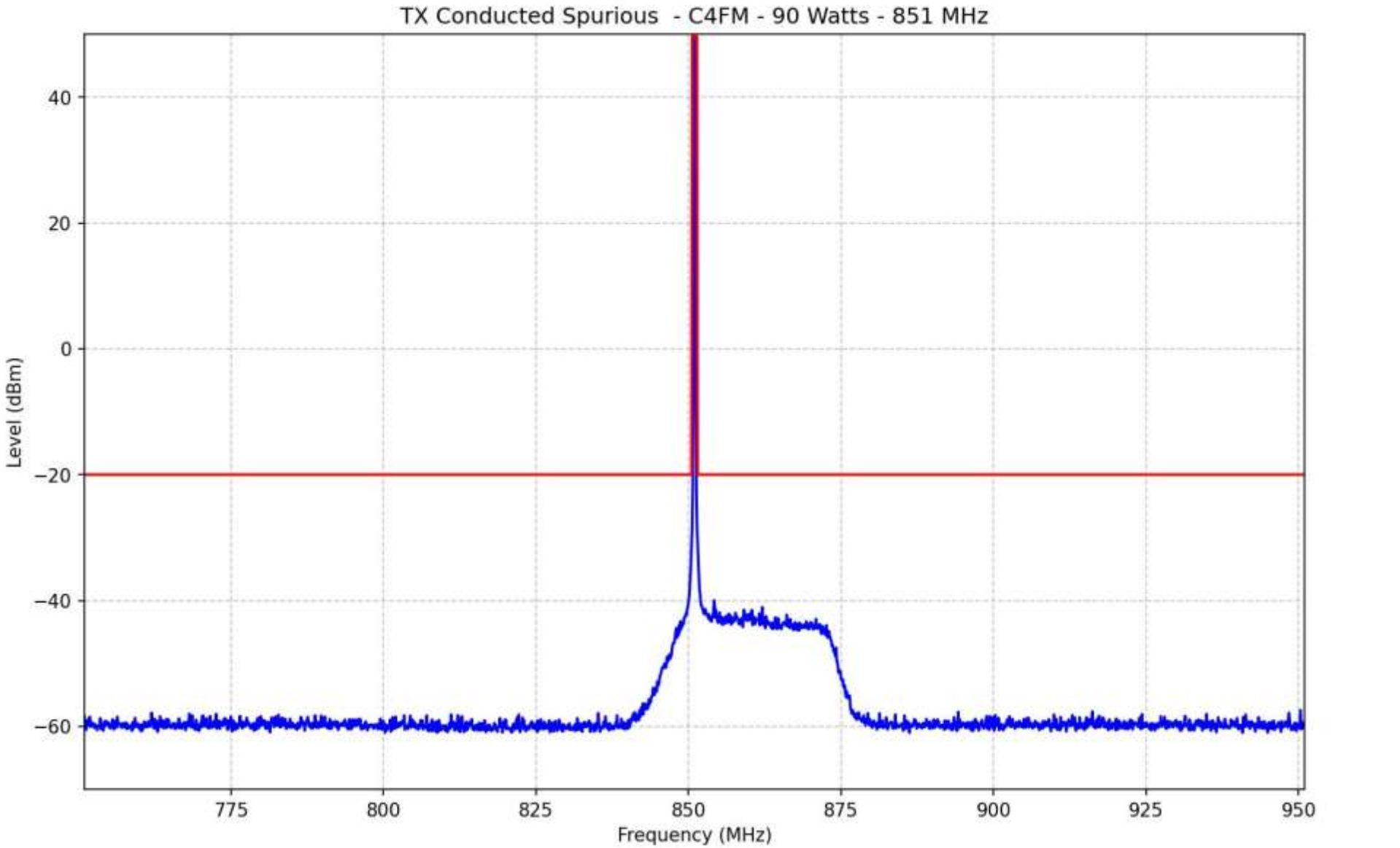
Report on Test Measurements

Conducted Spurious Emission Spectrum – 90Watts (Average) LSM – 200 MHz Span – High End of Band



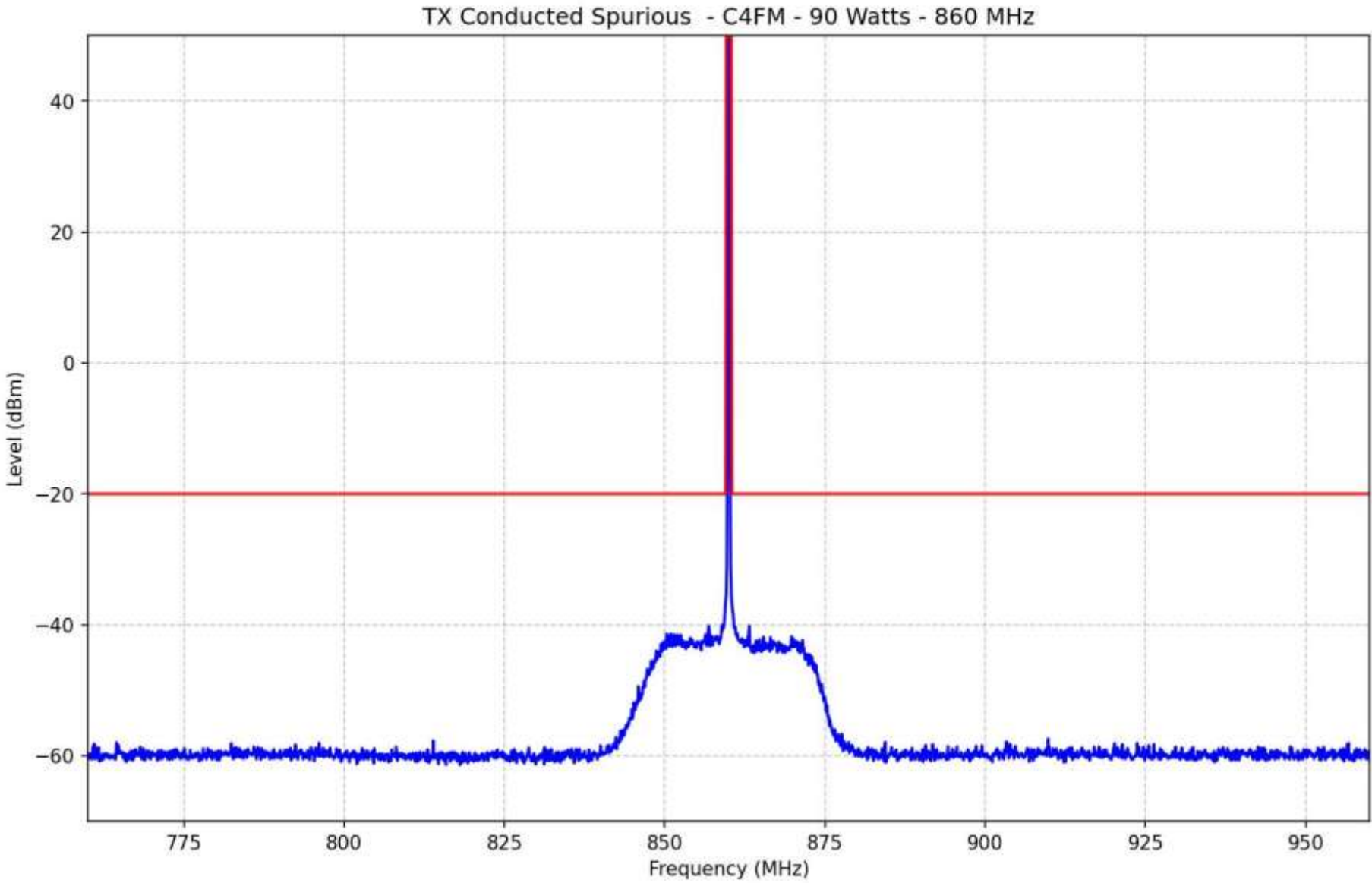
Report on Test Measurements

Conducted Spurious Emission Spectrum – 90 Watts C4FM – 200 MHz Span – Low End of Band



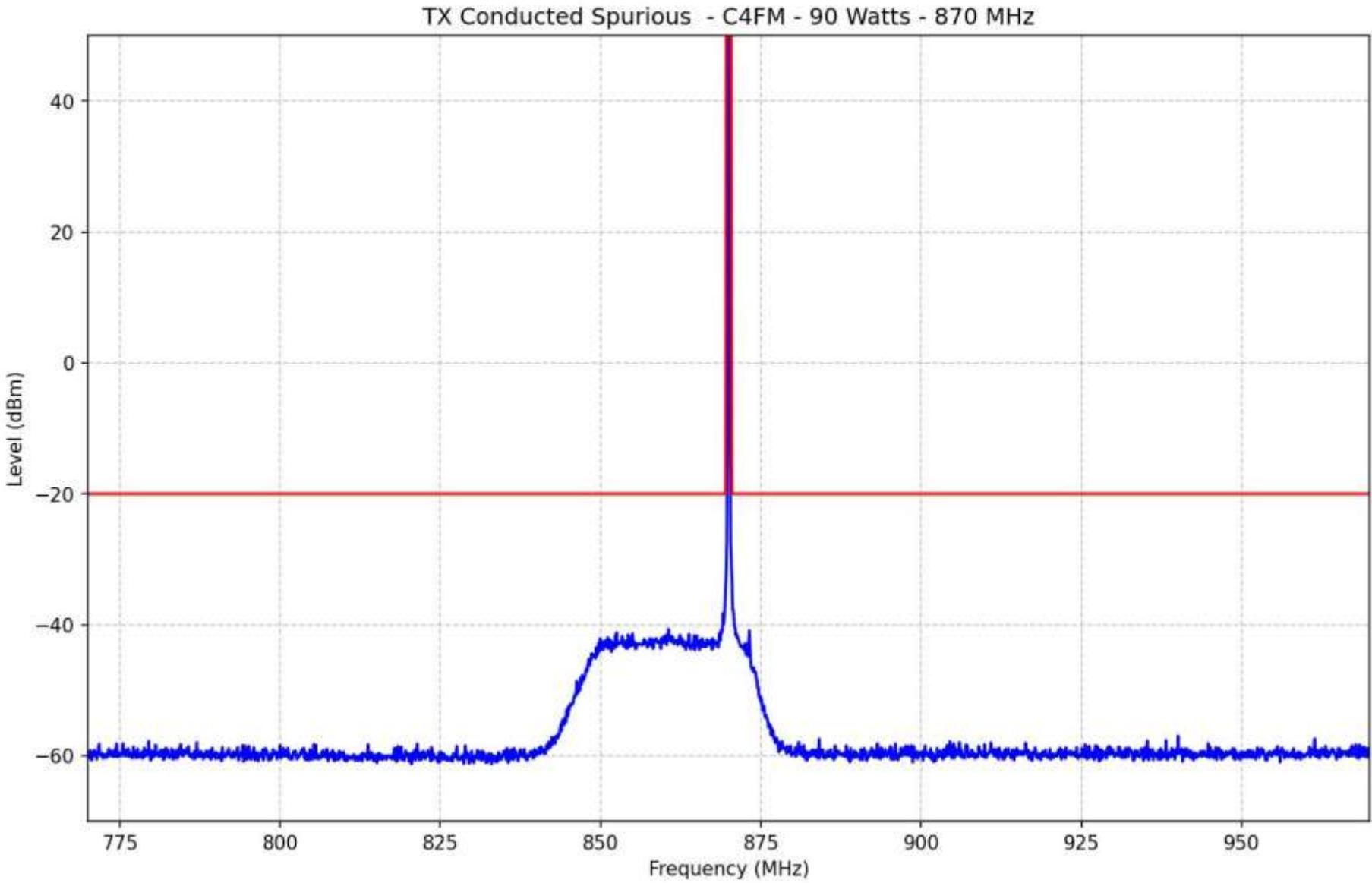
Report on Test Measurements

Conducted Spurious Emission Spectrum – 90 Watts C4FM – 200 MHz Span – Middle of Band



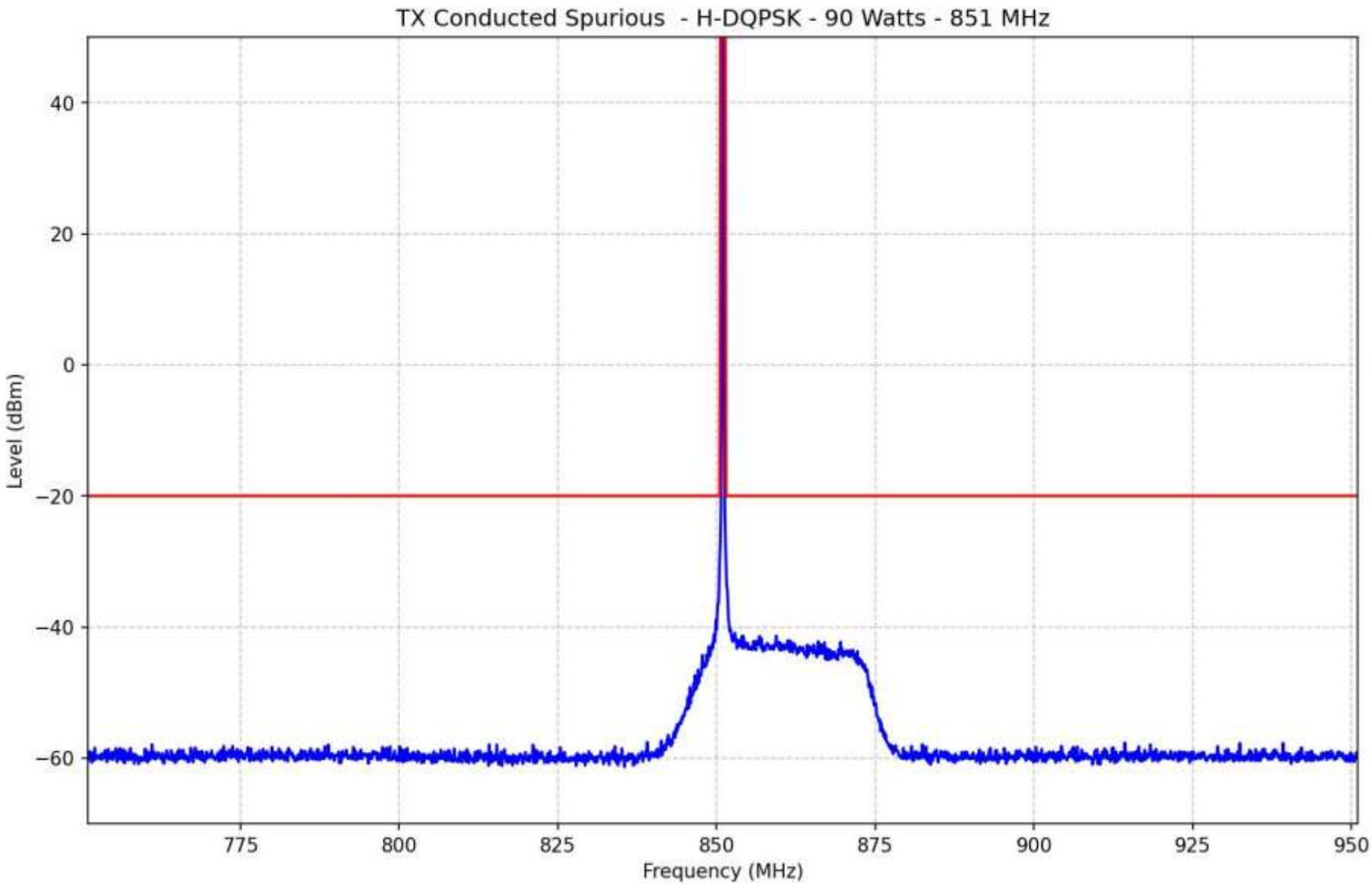
Report on Test Measurements

Conducted Spurious Emission Spectrum – 90 Watts C4FM – 200 MHz Span – High End of Band



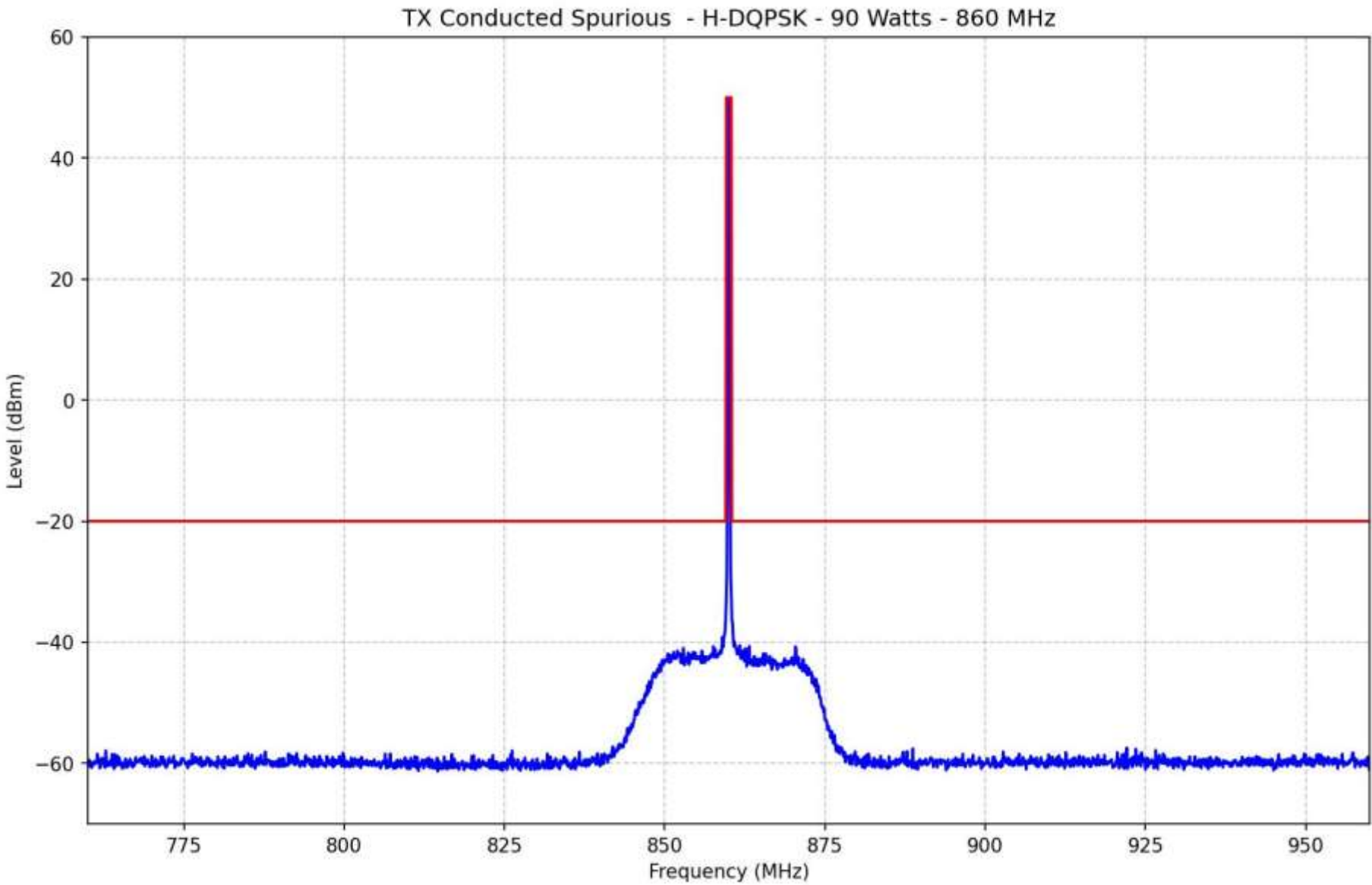
Report on Test Measurements

Conducted Spurious Emission Spectrum – 90 Watts H-DQPSK P25 Two Slot TDMA – 200 MHz Span – Low End of Band



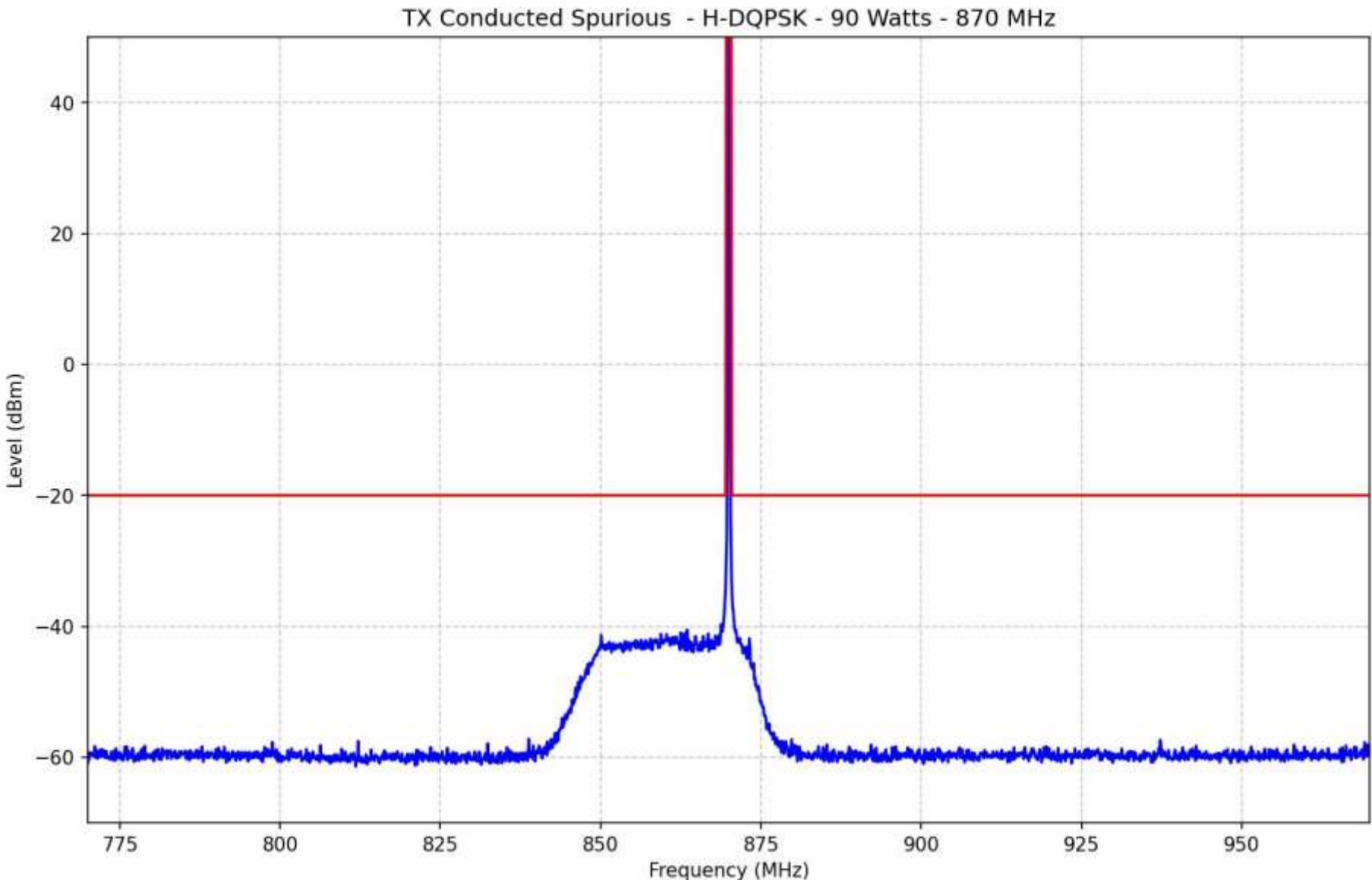
Report on Test Measurements

Conducted Spurious Emission Spectrum – 90 Watts H-DQPSK P25 Two Slot TDMA – 200 MHz Span – Middle of Band



Report on Test Measurements

Conducted Spurious Emission Spectrum – 90 Watts H-DQPSK P25 Two Slot TDMA – 200 MHz Span – High End of Band



Report on Test Measurements

Conducted Spurious Emissions – Harmonics and Emission Spectrum: Analyzer Screen Captures

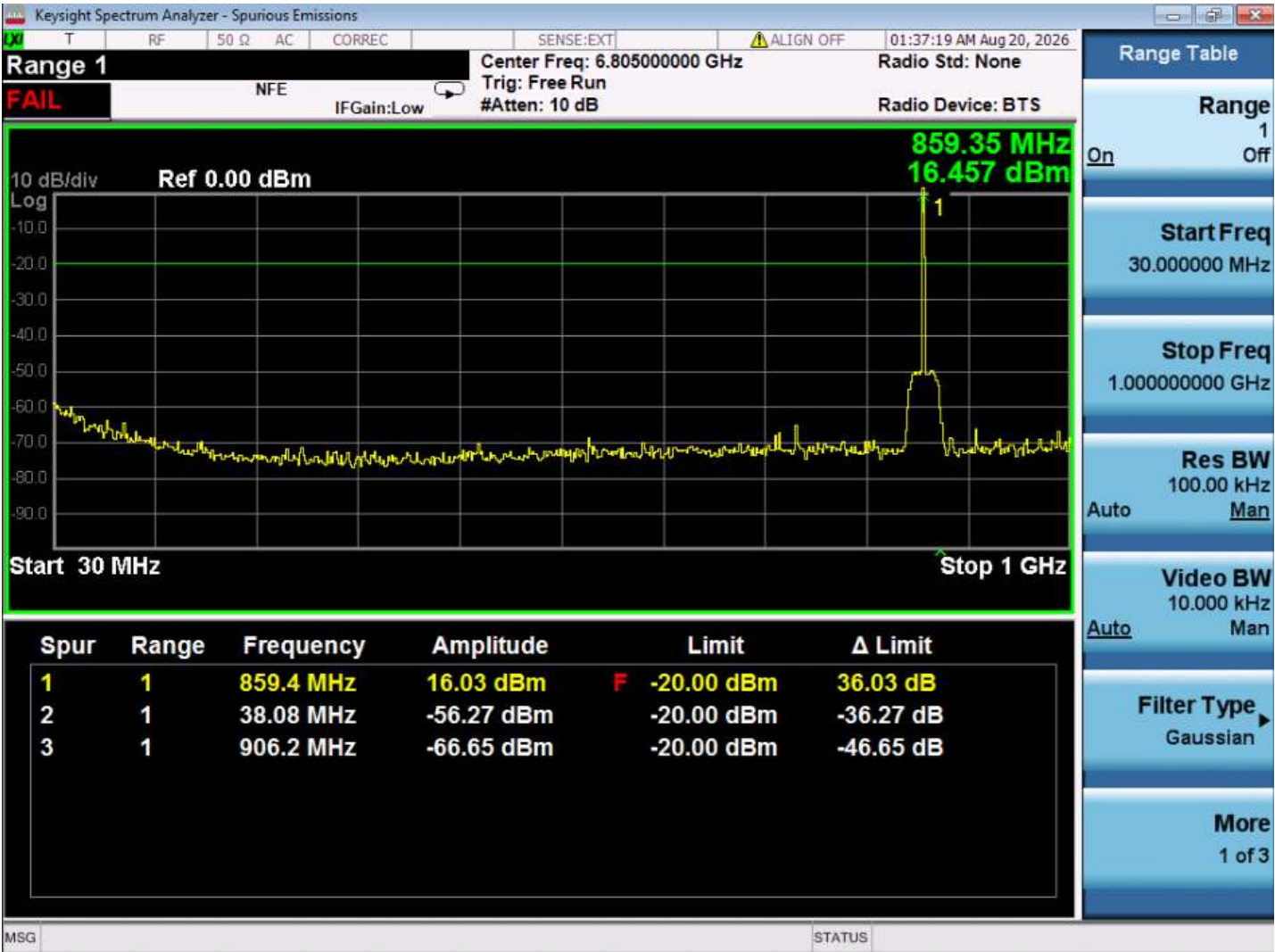
The RF Site is setup per the Conducted Spurious Emission Close-In diagram in Exhibit E1-7.4 to capture the spectrum from 30MHz to 1.8Fc. This method incorporates a notch filter to reduce the fundamental signal to improve dynamic range. The resulting fundamental signal will be lower than the total output power that is recorded via a power meter for confirmation. The path losses are characterized using a network analyzer and stored in a file and loaded into the analyzer to be used as a power correction.

The base radio is setup per the Conducted Harmonic Emission diagram in Exhibit E1-7.5 to capture the spectrums from 1.8Fc to 1GHz and from 1GHz to 10Fc. The method incorporates a high pass filter and directional coupler to reduce the fundamental signal to improve dynamic range. The power is verified via a power meter as noted in the diagram. The path losses are characterized using a network analyzer and are stored in a file and loaded into the analyzer to be used as a power correction.

The plots that follow show the mid-frequency response for each of the three modulations. Plots are shown for the spur measurements and the bandwidth settings for each frequency sweep.

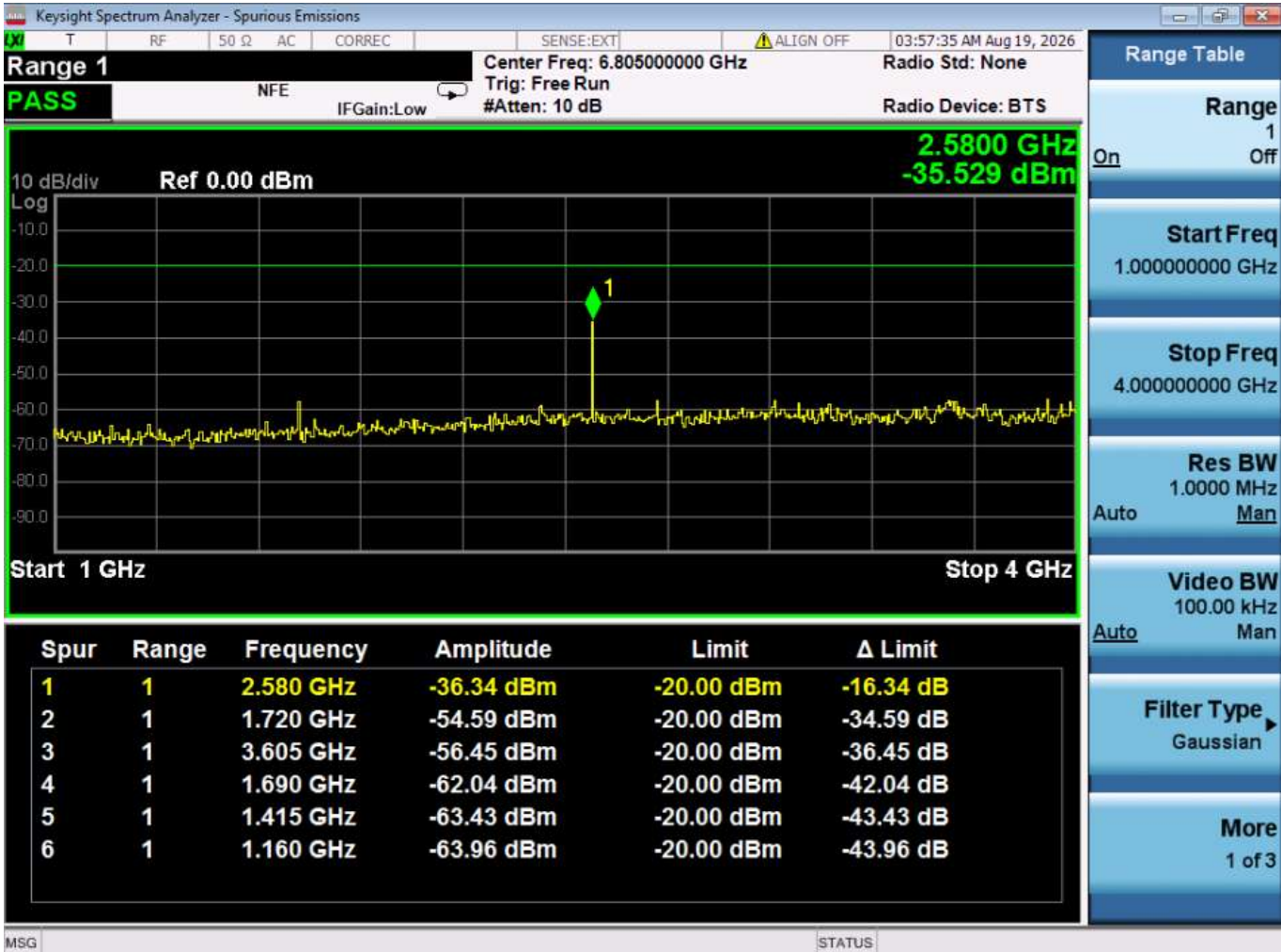
Report on Test Measurements

Conducted Spurious Emissions – Harmonics and Emission Spectrum: Linear Simulcast Modulation (LSM) Analyzer Screen Captures



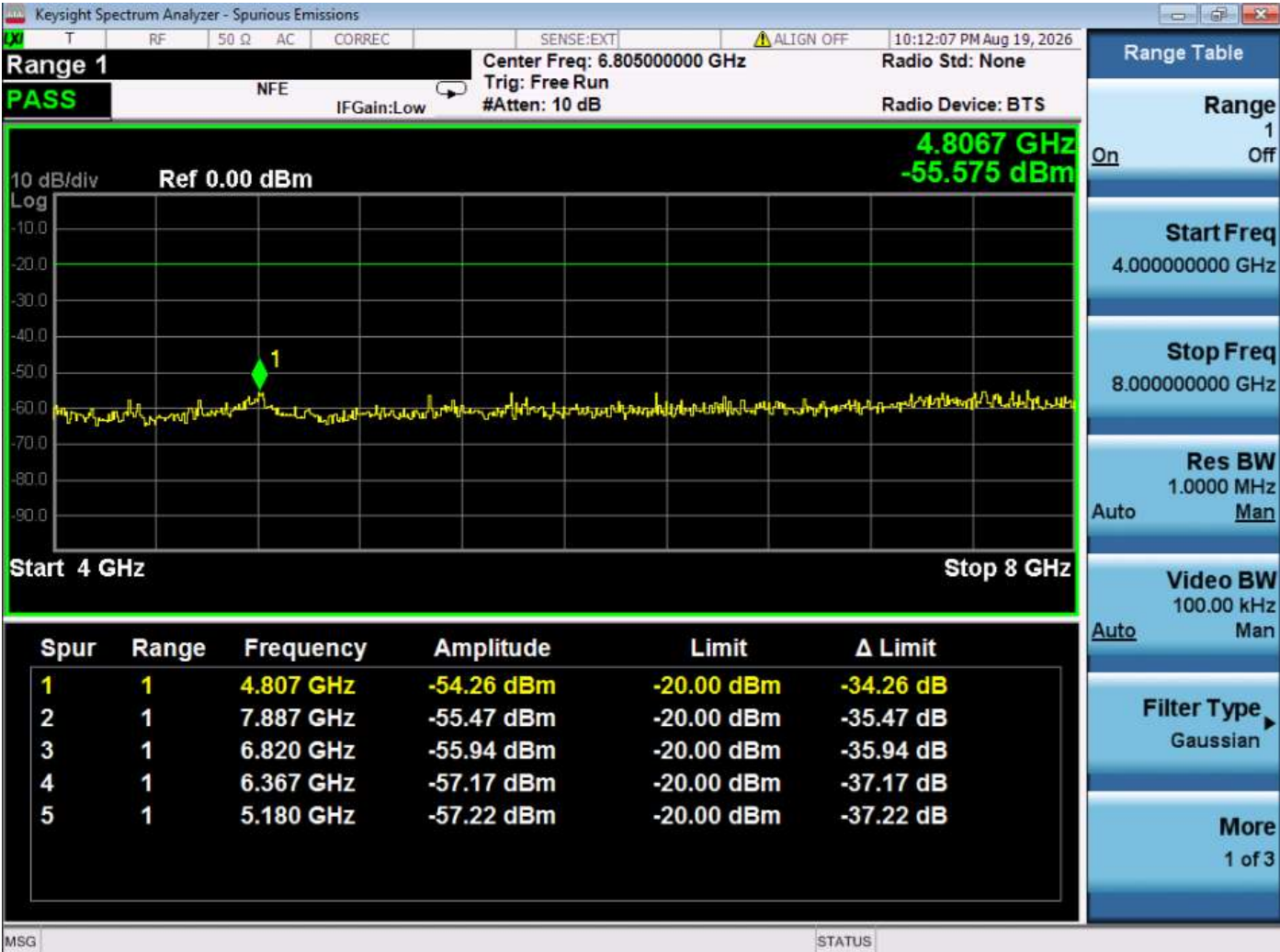
Report on Test Measurements

Conducted Spurious Emissions – Harmonics and Emission Spectrum: Linear Simulcast Modulation (LSM) Analyzer Screen Captures



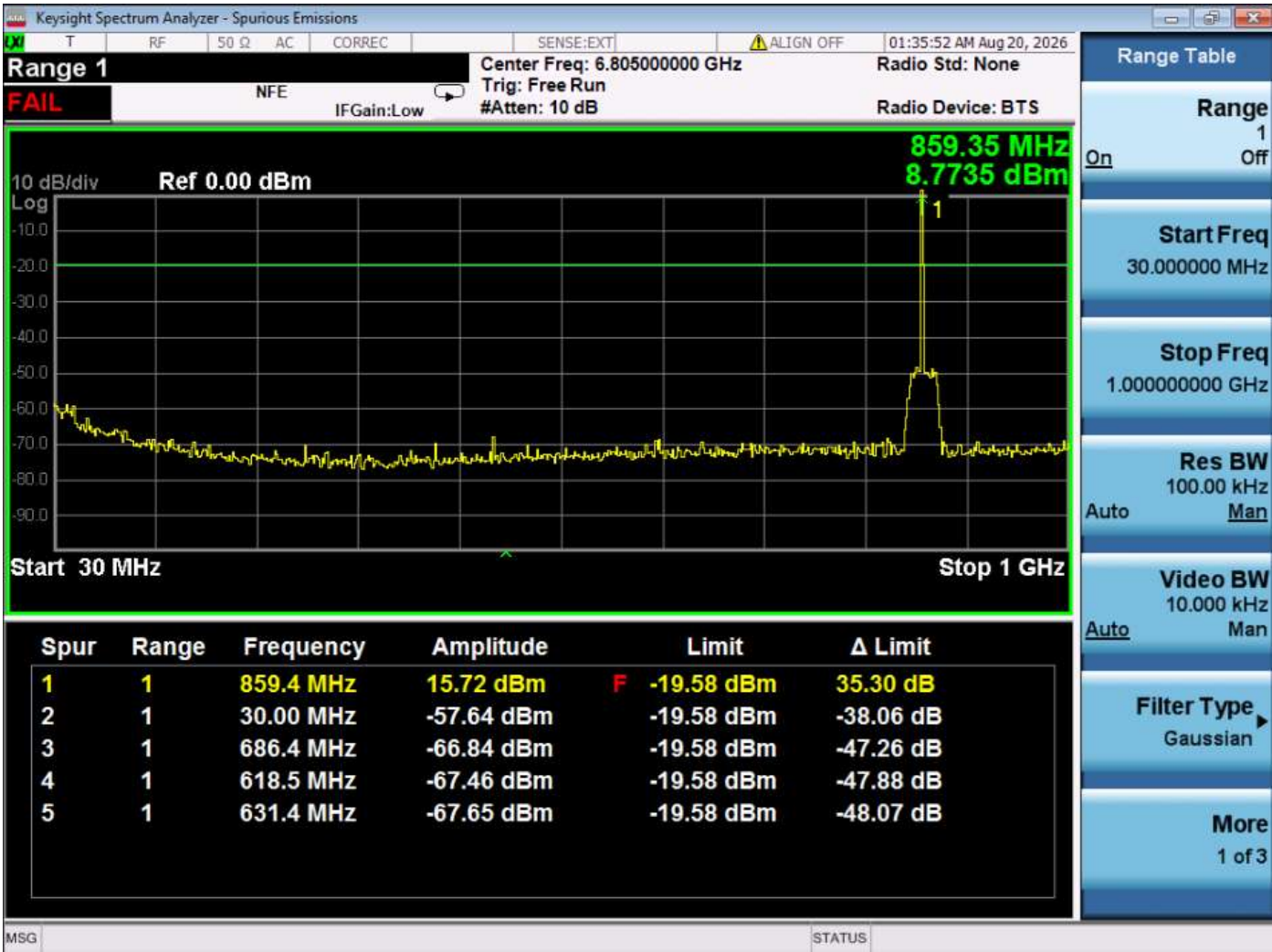
Report on Test Measurements

Conducted Spurious Emissions – Harmonics and Emission Spectrum: Linear Simulcast Modulation (LSM) Analyzer Screen Captures



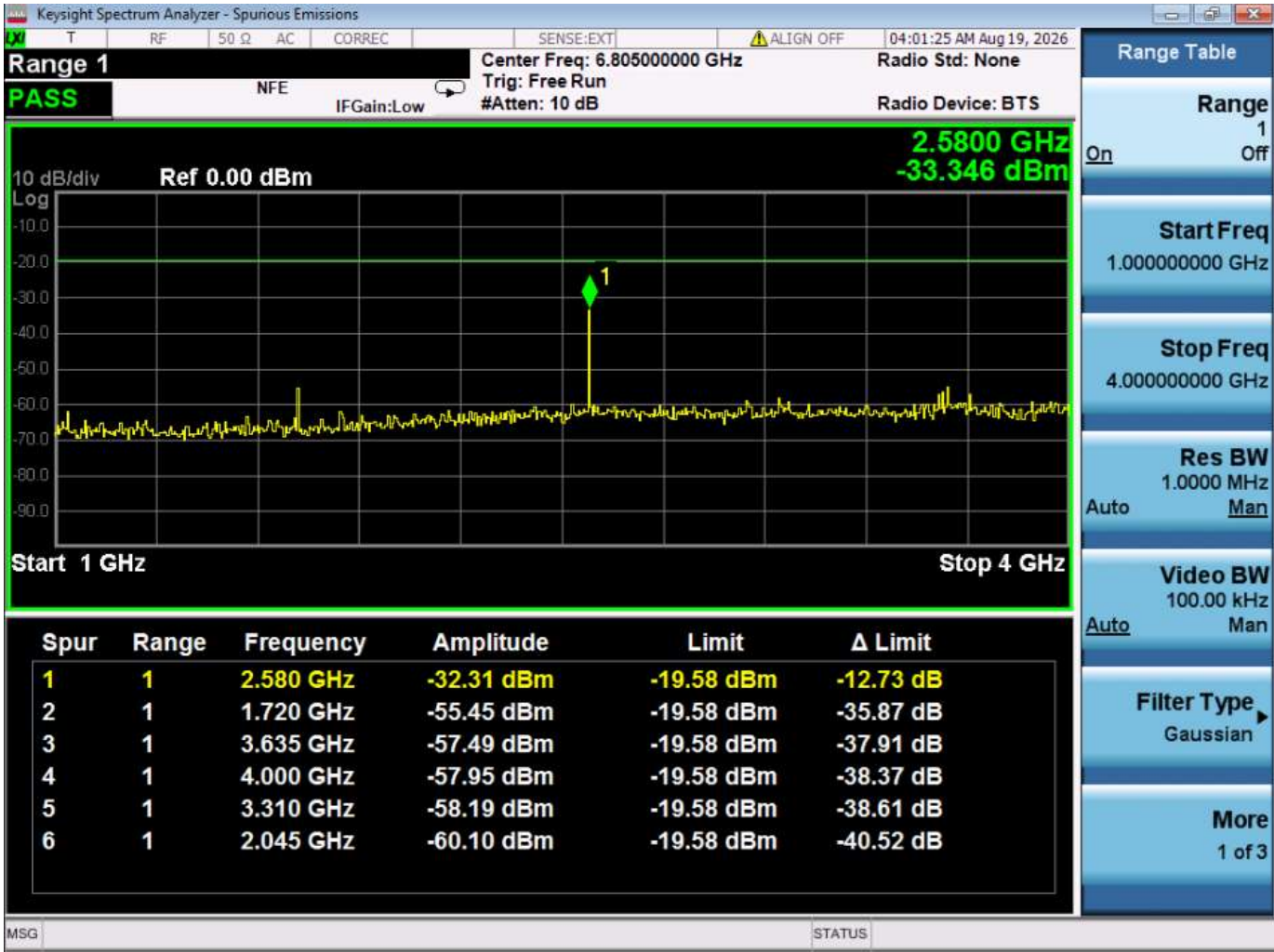
Report on Test Measurements

Conducted Spurious Emissions – Harmonics and Emission Spectrum: Compatible 4-Level Frequency Modulation (C4FM) Analyzer Screen Captures



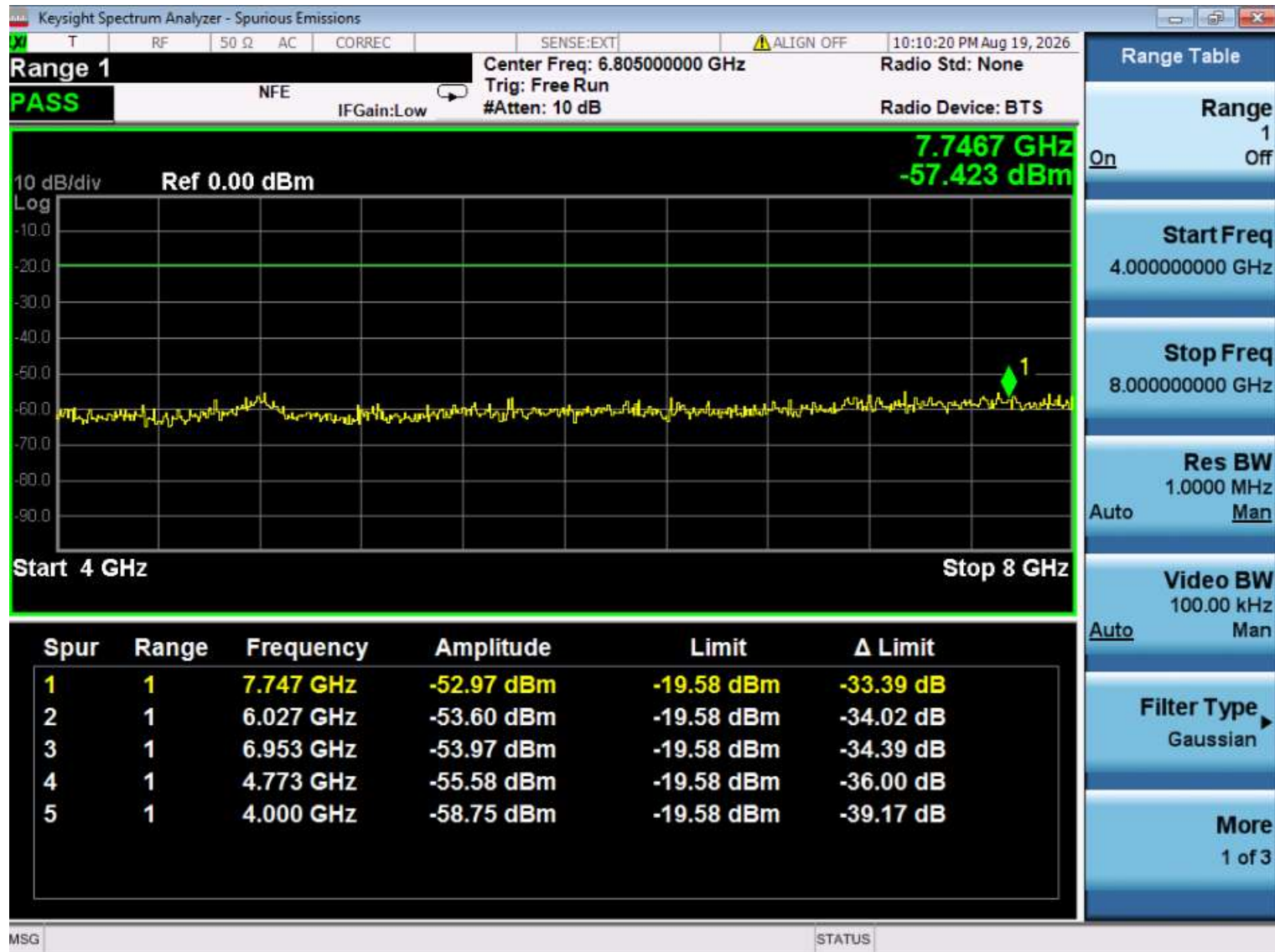
Report on Test Measurements

Conducted Spurious Emissions – Harmonics and Emission Spectrum: Compatible 4-Level Frequency Modulation (C4FM) Analyzer Screen Captures



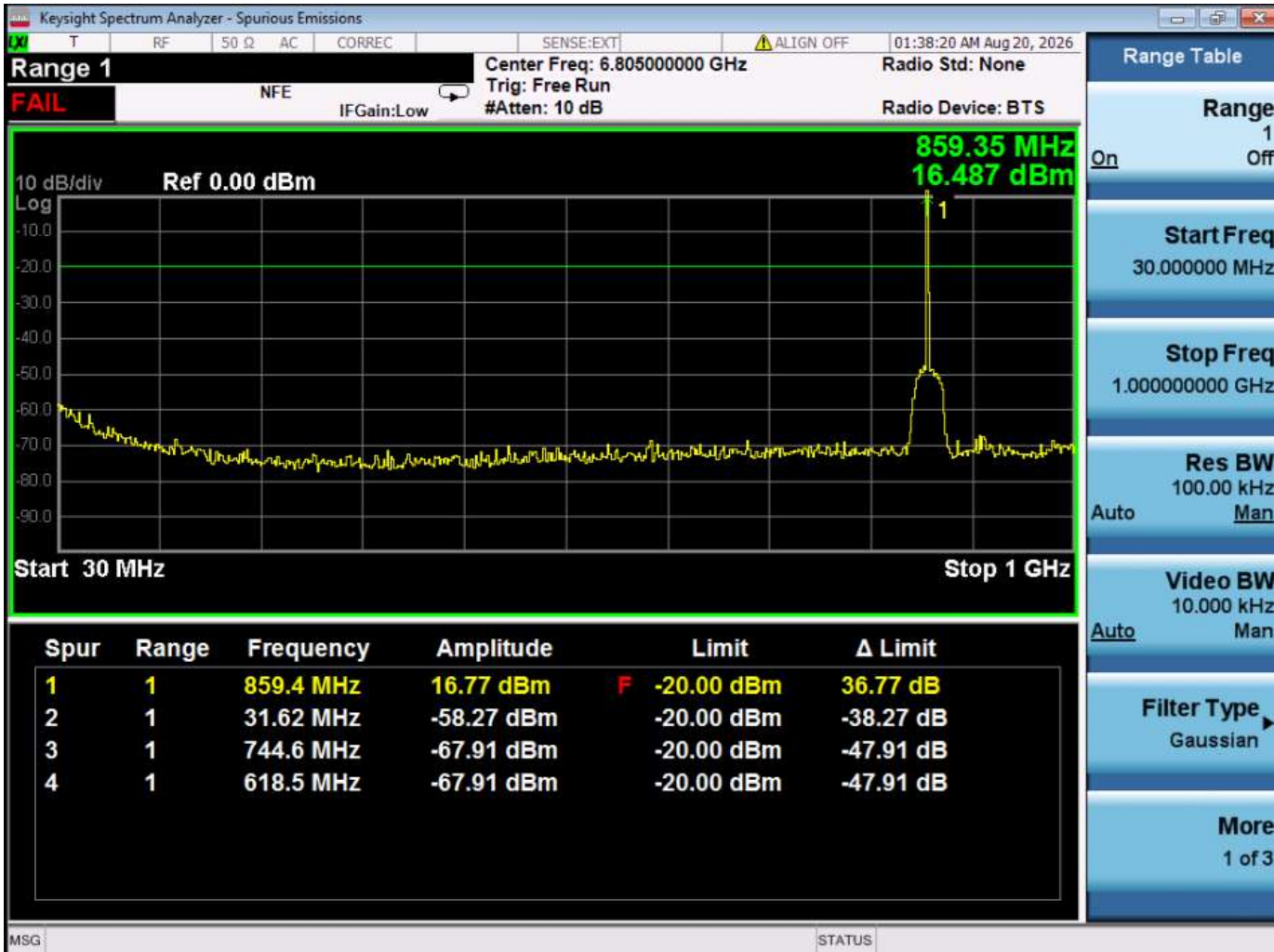
Report on Test Measurements

Conducted Spurious Emissions – Harmonics and Emission Spectrum: Compatible 4-Level Frequency Modulation (C4FM) Analyzer Screen Captures



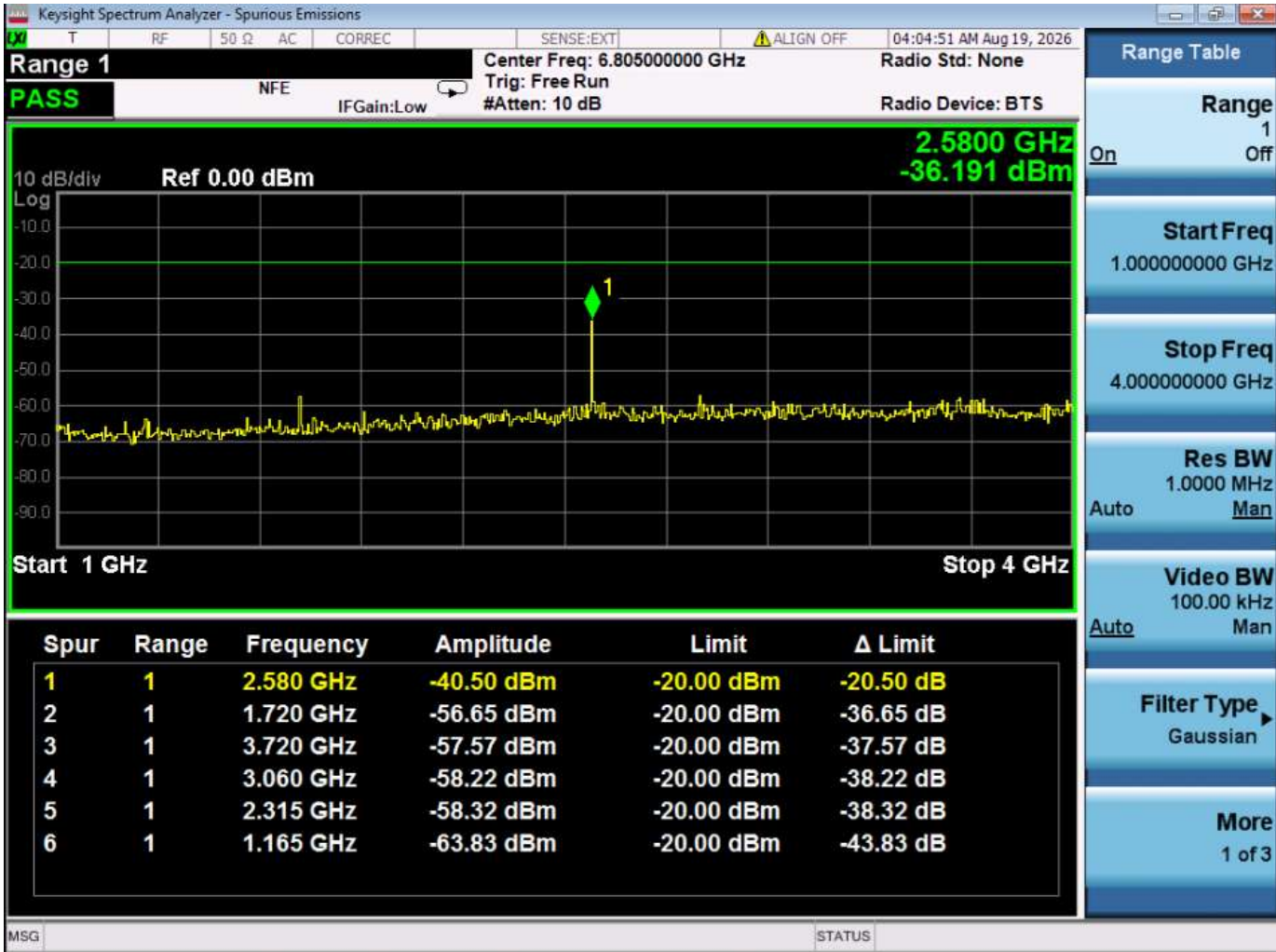
Report on Test Measurements

Conducted Spurious Emissions – Harmonics and Emission Spectrum: P25 Two Slot TDMA Digital Modulation (H-DQPSK) Analyzer Screen Captures



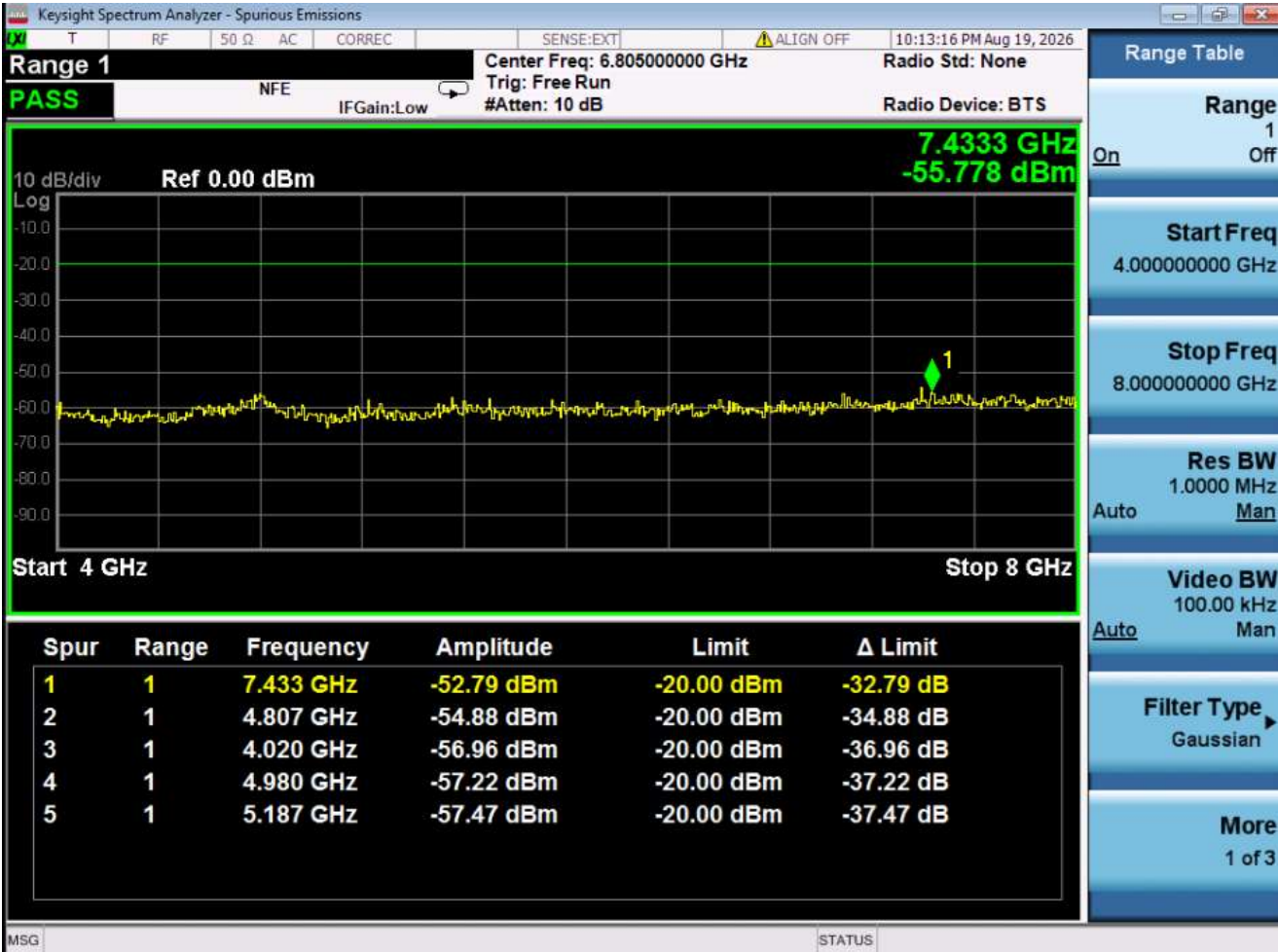
Report on Test Measurements

Conducted Spurious Emissions – Harmonics and Emission Spectrum: P25 Two Slot TDMA Digital Modulation (H-DQPSK) Analyzer Screen Captures



Report on Test Measurements

Conducted Spurious Emissions – Harmonics and Emission Spectrum: P25 Two Slot TDMA Digital Modulation (H-DQPSK) Analyzer Screen Captures



Report on Test Measurements

Radiated Spurious Emissions, Harmonics

Specification Requirement 47 CFR §90.210(d) and IC RSS-119 section 5.8.3 - Emission Limits – “D-Mask”:

Emission Mask D: For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: *At least 50 plus $10 \log_{10}(P)$ dB or 70 dB, whichever is the lesser attenuation.*

Modulation: Linear Simulcast Modulation (LSM), Compatible 4-Level Frequency Modulation (C4FM) or P25 Two Slot TDMA Digital Modulation (H-DQPSK) as indicated

Carrier Frequencies: Radiated Spurious Emissions was run with 9 carriers transmitting at 90W and 2W per carrier. Frequencies tested were 851 (C4FM), 852 (LSM), 859 (C4FM), 860 (H-DQPSK), 869 (C4FM), 870 (H-DQPSK). These frequencies represent the low end, center, and high end of the 851-870 MHz band, and are representative of the full operating band.

EXHIBIT	DESCRIPTION
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Not Retested

Report on Test Measurements*Oscillator Frequency Stability*

Manufacturer data for the system site frequency standard was used in generation of the following frequency stability exhibits.

Specification Requirement: Reference RSS-119 Section 5.3

Fixed and Base stations operating at 851-866 MHz and 866-869 MHz must have a frequency stability of better than +/- 1.0 PPM for 12.5 kHz channel spacing and +/- 1.5 PPM for 25 kHz channel spacing.

Specification Requirement: Reference Part 90.213

Fixed and Base stations operating at 851-854 must have a frequency stability of better than +/- 1.0 PPM.

Fixed and Base stations operating at 854-869 must have a frequency stability of better than +/- 1.5 PPM.

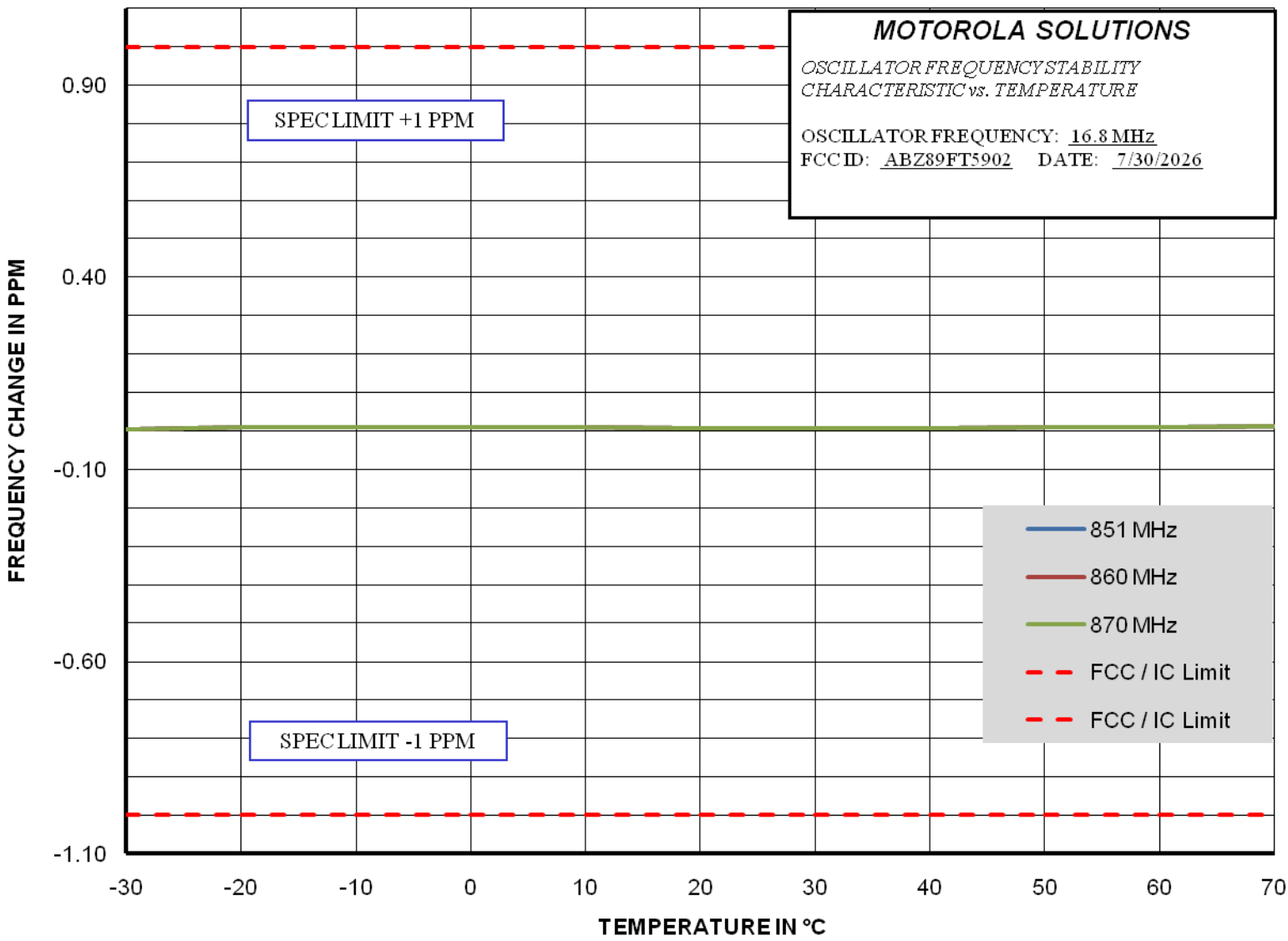
Only the more stringent specification limit is shown on the frequency stability exhibits.

Performance was measured at carrier frequencies at the low end, middle, and high end of the operating band.

EXHIBIT	DESCRIPTION
E1-5.1	Frequency Stability Vs Temperature
E1-5.2	Frequency Stability Vs Voltage

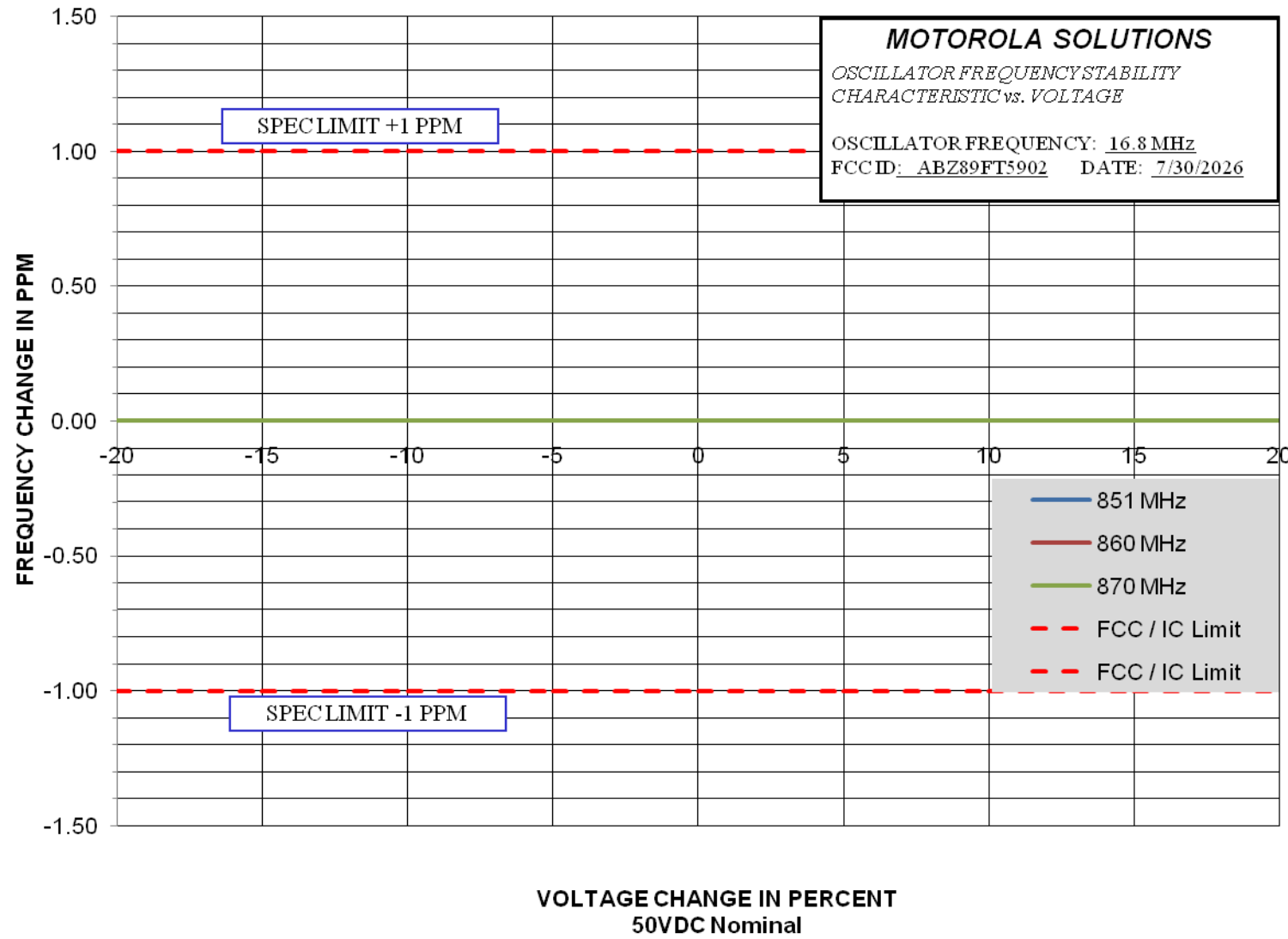
Report on Test Measurements

Frequency Stability Vs Temperature



Report on Test Measurements

Frequency Stability Vs Voltage



APPLICANT: MOTOROLA SOLUTIONS

EQUIPMENT TYPE: ABZ89FT5902
109AB-T5902

Report on Test Measurements

Test Setup Details

Test Locations:

Motorola Solutions, Inc., Schaumburg Lab
2000 Progress Parkway, Schaumburg, IL 60196
FCC Registration Number 786245
IC CAB Identifier US0220
Test Engineer Kelsey Johnson

Report on Test Measurements

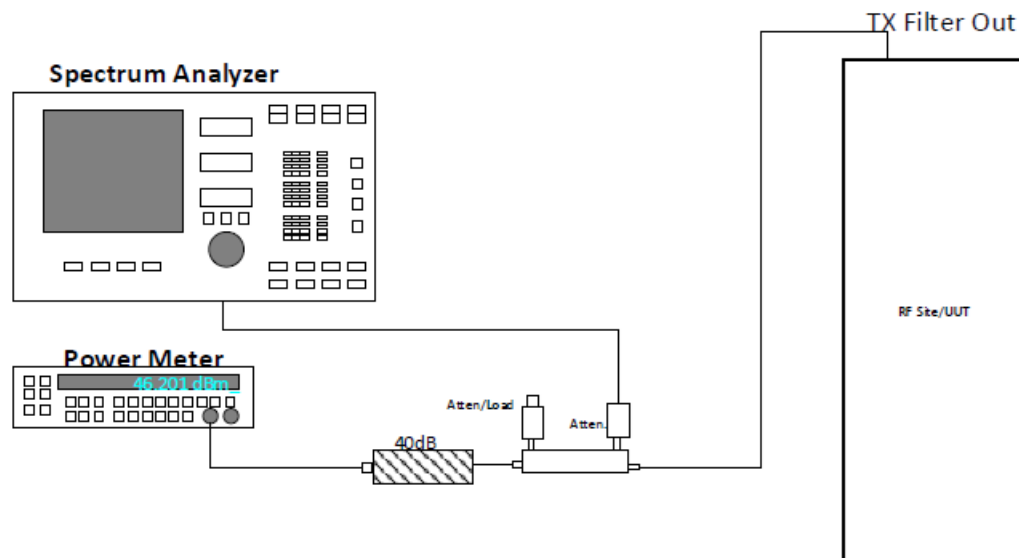
Test Equipment List (Motorola)

Manufacturer	Model	Description	Serial Number	Last Cal
Keysight	N9030A	PXA Signal Analyzer, 3 Hz to 50 GHz	MY53310751	07-19-2025
Rohde & Schwarz	NRP-Z11	Power Sensor	101590	08-21-2024
Rohde & Schwarz	NRX	Power Meter	108809	05-20-2025
Keysight	34401A	Digital Multimeter	3146A59752	08-29-2022
Keysight	E5071C	ENA Series Network analyzer	MY46316134	07-23-2025
Thermotron	WP-499- TCM4-30- 30-RR	Temperature Chamber	52516	03-25-2026

Report on Test Measurements

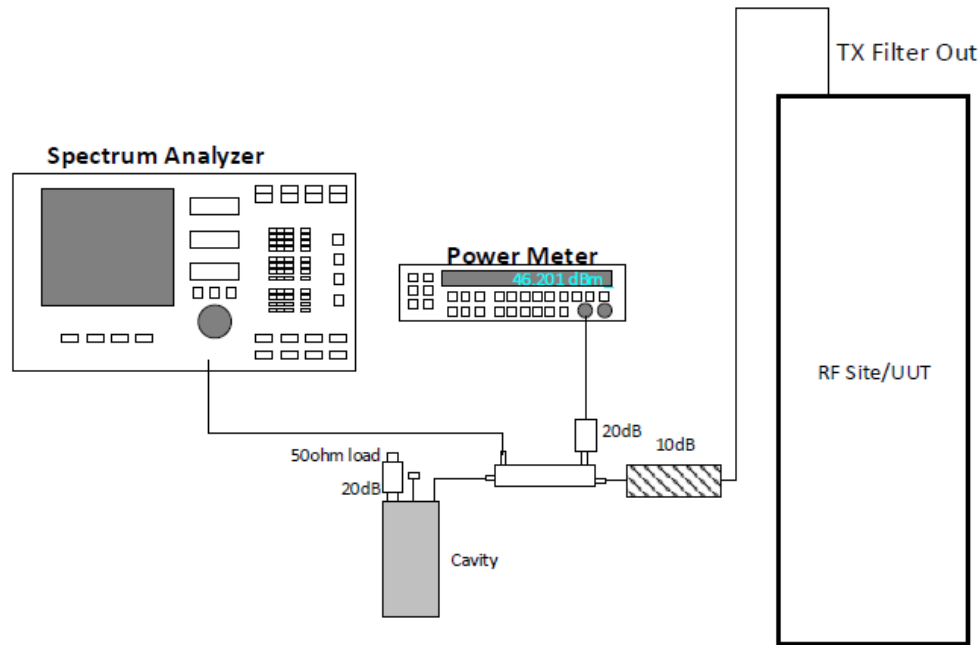
Test Setup (Motorola Solutions)

RF Output Power, Occupied Bandwidth, Frequency Stability, Frequency Transient Behavior, Modulation Characteristics



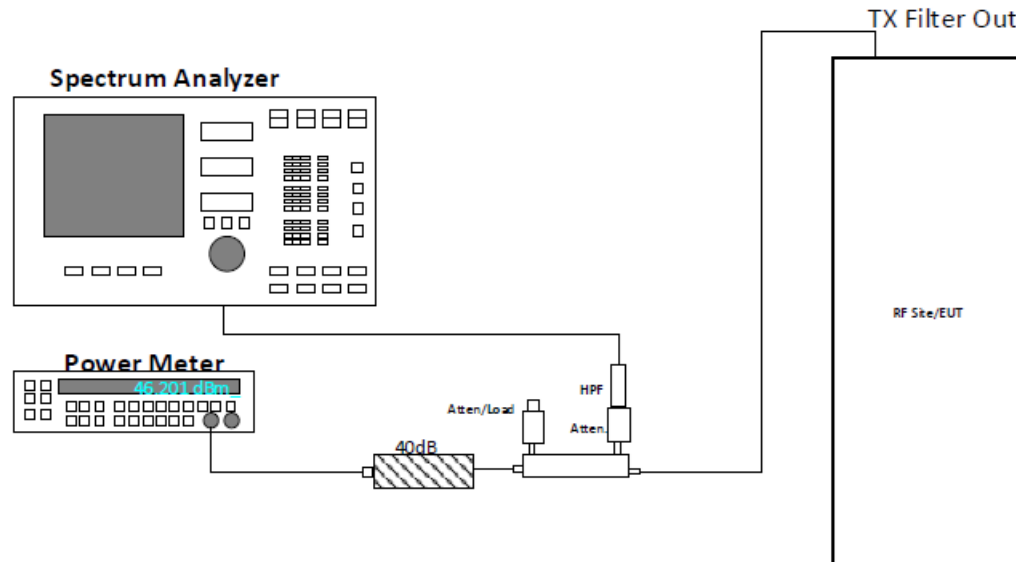
Report on Test Measurements

Conducted Spurious Emissions Close-in



Report on Test Measurements

Conducted Harmonic Emissions



Report on Test Measurements

Unit under test in temperature chamber (adjacent to test system)



Report on Test Measurements

Statement of Certification

The technical data supplied with this application, having been taken under my supervision is hereby duly certified. The following is a statement of my qualifications:

College Degree: BSECE, Michigan State University, East Lansing, MI, USA

4 years of Design and Development experience in the field of two-way radio communication.

NAME: Kelsey Johnson

SIGNATURE:  _____

DATE: August 13, 2026

POSITION: Senior RF Engineer

I hereby certify that the above application was prepared under my direction and that to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct:

NAME: Matt Nawrocki

SIGNATURE:  _____

DATE: August 19, 2026

POSITION: Engineering Manager